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Preferential Tariff Formation
The Case of the United States

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This paper addresses the impact of Multilateral Trade Liberalisation (MTL) on the preferential tariffs granted by the United States. For a given MFN tariff, we model the preferential tariff with a simple linear functional form. We take MTL of the US as known to the world by the end of Uruguay Round in 1994 and estimate its impact on preferential tariff negotiations during 1995 to 2007. We use a three dimensional panel data, which takes into account the partner, product and time variation of the data-set. To complete our data-set, we codify eight PTA legal agreements. We draw three important conclusions. First, the products that are highly protected do not get high preferential access even at the regional level. Second, reciprocity plays only a limited role in granting better preferential access. Third, irrespective of development level of the partner, the non-reciprocal GSP preferences always matter.

Keywords: MFN tariffs, preferential tariffs, reciprocity, GSP
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1 Introduction

The fast growth of Preferential Trade Agreements (PTAs) has focused the attention of policymakers and trade economists on comparisons between the multilateral trade liberalisation (MTL) under the WTO and the process of preferential liberalisation at regional level. The proliferation of PTAs presents WTO Members with both -- the challenges and the opportunities. The promotion of free trade through PTAs can foster regional trade liberalization and ultimately help the MTL. On the other hand, it is also possible that the development of complex networks of preferential trade relations increases discrimination among trading partners and may well undermine transparency and predictability in multilateral trade regime.

Whether lower preferential tariffs are building block or stumbling block to the multilateral tariff reduction has been the 'classic question' of debate since 1991. Starting from Bhagwati(1991) followed by Grossman and Helpman (1995), Levy (1997) and Krishna (1998) to more recently Limao (2007) are examples of some influential papers on this important question. Ethier (1998) and Freund (2000) address the 'reverse question' by theoretically developing a model for understanding the impact of MTL on the formation of PTAs.

The purpose of this paper is to empirically analyze whether the lower MFN tariff makes it easier to lower tariff preferentially. In particular, we address this set of issues in case of the United States (US), one of the oldest members of the GATT/WTO. This paper attempts to address two specific questions. First, if the MFN tariffs set in 1994 in the context of WTO bindings are higher, does it lead to higher preferential tariffs in post-Uruguay Round PTAs? Second, the US being a large trading partner in such agreements, does the degree of reciprocity in the post-Uruguay Round PTAs matter for allowing lower preferential tariffs?

Following Baldwin and Seghezza (2008), and Limao (2007); we develop an empirical model for preferential tariff in which we control for variables that could potentially affect the preferential tariffs. Three variables that are relatively easy to measure are – MFN applied tariffs, reciprocity and GSP. The other variables, e.g. political economy forces, product specific rules of origin, transportation costs etc. are difficult to measure and are controlled by the fixed effects. Since we use a large panel data, we are able to estimate the coefficients of our interest by the fixed effects model.

A major contribution of this paper is the quantification of reciprocal market access. For this, we construct a reciprocity variable that measures product-wise and year-wise market access by each of thirteen US partners. For constructing this variable, we needed detailed data especially on preferential tariff applied by each partner on US products. The WTO does not have this kind of data for developing countries, so we codified eight PTA legal agreements[2] to construct a unique data-set for the study period 1995- 2007.

We reach three important conclusions –

1) We find strong evidence that products that are highly protected at the MFN level (eg. agriculture and fisheries sector) get less preferential access to the US.

2) Reciprocity shown matters to the US but only up to a limited extent. Higher reciprocity does not always ensure lower preferential tariff for partners' products.

3) Non-reciprocal GSP preferences matter in formation of preferential tariffs. Once the US has allowed GSP benefit on certain products to some developing countries, it is easier to grant lower preferential tariffs on such products to PTA partners.

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

2 The US's Tariff Structure

US is an original WTO member, and has contributed comprehensively in multilateral trade liberalisation (MTL) since the inception of the GATT in 1947. At the same time, the US has undertaken bilateral and regional trade liberalisation with some of its trading partners. As per the

[2] Out of thirteen partners in this study, for five the data is available from TRAINS and IDB database. For other eight partners, we do not have sufficient data from these sources.

US Trade Policy Review, 2008 the US had PTAs with 20 partner countries[3] . The US also grants non-reciprocal tariff preferences to developing countries under several schemes.

2.1 MFN Tariff Structure

The US tariff schedule is based on the Harmonized Commodity Description and Coding System, (HS)[4]. The US customs code contained 10,253 tariff lines at the HS 8-digit level (Chapters 1-97) in 2007 (Annex I). Following the Uruguay Round, the US bound all tariff lines, except two lines covering crude petroleum. The average bound tariff rate[5] is 4.7%. In general, MFN applied tariffs[6] are at their bound rates. The simple average applied tariff, including the ad valorem equivalents of specific and compound rates was 4.8% in 2007 (Annex II). The average applied tariff for agricultural and non-agricultural products was 8.9% and 4%, respectively in 2007. Approximately 37% of all tariff lines were duty-free in 2007. On average non-*ad valorem* tariffs[7] ensured higher protection than *ad valorem* tariffs.

Around 5% of all tariff lines had MFN tariff exceeding 15% in 2007. The agricultural products (WTO definition) subjected to the highest tariff rates are tobacco (350%), sour cream (177.2%), and peanuts (163.8%). Other high MFN (between 50% and 110%) agricultural products are milk, cream, butter substitutes, cheese, goose liver, sugar, cocoa powder, prepared mustard and cotton fibres. The non-agricultural products subjected to higher tariff duties between 30% and 64% are tuna, apparel, footwear and brooms. Tariff quotas cover slightly less than 2% of all tariff lines.

[3] By 2007, the US had PTAs with Canada, Mexico, Israel, Jordan, Chile, Singapore, Australia, Morocco, Bahrain, Central American countries (El Salvador, Honduras, Nicaragua, Guatemala) and Dominican Republic (14 partners). With other six partners namely, Colombia, Costa Rica, Panama, Peru, Korea and Oman; it has already signed the PTAs, but has not yet implemented.

[4] The countries have harmonized their customs code under the World Customs Organization (WCO). We use 'Harmonized System' or HS code for our study. Under the HS system, all countries have same coding of products on six digit basis, so we focus on six digit products of HS classification.

[5] By January 2004, virtually all tariff lines had reached their final bound MFN tariff rate except HS 3404.2000 (artificial waxes and prepared waxes), which become free of duty in January 2009.

[6] The United States accords MFN tariff treatment to all but one WTO Member (Cuba). Unlike EU; the US levies customs duties on the basis of the f.o.b. (not c.i.f.) value of imports at the point of export.

[7] Apart from agricultural products, non-ad valorem tariff also applies to articles of apparel and clothing, footwear and headgear, watches, and precision tools.

2.2 Preferential Tariff Structure

Tariff preferences are granted by the US either unilaterally or in the context of Preferential Trade Agreements (PTAs), subject to compliance with 'rules of origin' criteria. The US grants unilateral preferential treatment under the U.S. Generalized System of Preferences (GSP)[8], the Caribbean Basin Economic Recovery Act (CBERA) [9], the Andean Trade Preference Act (ATPA)[10] and the African Growth and Opportunity Act (AGOA)[11]. These preferences are conditional on compliance with the rules of origin criteria[12]. For an overview of preferential tariffs, refer Annex III.

By 2007, the US had PTAs with fourteen partners: Australia, Bahrain, Canada and Mexico (NAFTA), Chile, Israel, Jordan, Morocco, Singapore, and four of the five members of the Central American Common Market (El Salvador, Guatemala, Honduras, and Nicaragua) and the Dominican Republic. These agreements share several characteristics, with respect to the coverage and the scope of tariff elimination. The US grants preferential treatment to originating goods[13,14] under these PTAs.

[8] Under the GSP, the US grants duty-free treatment on certain products from eligible developing countries. Duty-free imports under the GSP program amounted to US$30.8 billion in 2007, 1.6% of total U.S. imports.

[9] Under the CBERA, the following received benefits as in late 2007: Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Costa Rica, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Netherlands Antilles, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago.

[10] Under the ATPA a wide range of products from Bolivia, Colombia, Ecuador, and Peru are eligible for duty-free treatment.

[11] Under the AGOA, the US grants duty-free treatment on products benefiting from GSP and on 1,835 additional tariff-line items from eligible sub-Saharan African countries.

[12] In general, rules of origin under unilateral tariff concessions require goods that do not meet the wholly obtained criterion to fulfill local-content requirements to qualify for preferential treatment. The value of imported inputs may be counted toward satisfying the local-content requirement if the inputs have been substantially transformed into a new and different article of commerce before being used to produce the good that is imported into the United States. This criterion is known as double substantial transformation.

[13] The US preferential trade agreements use the "wholly obtained" criterion. For goods that do not meet this criterion, most agreements establish specified changes of tariff classification to determine eligibility, and to a lesser extent, regional value content criteria, either separately or in combination. For some products, these rules may also establish certain production requirements.

[14] As per the Trade Policy Review (TPR), WTO 2008, the US imports from PTA partners were approximately US$568 billion in 2006, around 31% of total imports. The US exports to PTA partners totaled US$377 billion in 2006, close to 41% of all U.S. exports.

3 Literature Review

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

3.1 Theoretical Literature

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

On contrast addressing the *reverse question*, Ethier (1998) gives a model when the demand for final goods rises due to the MTL, and the rich country may source the production of intermediate goods to the developing countries. This encourages the formation of PTAs between rich country

and the developing country. Freund (2000) explores how MTL affects the incentive of a country to join a PTA and the associated self-enforcement mechanism. Using the oligopolistic model of trade, she finds that as the multilateral tariff level falls, the forces pulling countries away from free trade and into bilateral agreements get strengthen.

3.2 Empirical Literature

Estevaldeordal, Freund and Ornelas (2008) examine the effect of regionalism on unilateral trade liberalization using industry-level data on applied MFN tariffs and bilateral preferences for ten Latin American countries from 1990 to 2001. They suggest that concerns about a negative effect of preferential liberalization on external trade liberalization are unfounded and support the building block argument about PTAs. On the other hand, addressing the *reverse question*, Fugazza and Nicoud (2008) show that products for which the US agreed to cut its MFN tariffs substantially between the end of the Tokyo and Uruguay Rounds of GATT negotiations (1979-1994) are also the products for which subsequent tariff cuts on a preferential basis are boldest.

The importance of MFN and preferential tariffs in PTAs and their relationship has been well developed in Baldwin and Seghezza (2008), and Limao (2006). The focus of these studies has been on estimating building or stumbling block effects of PTAs on MTL. These papers take the preferential tariffs as exogenous and access their impact on MTL by the members of PTA. For example, Limao (2006) uses the following linear approximation[15] (equation *E4* in his paper) to estimate the stumbling block effects of the US PTAs

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

where, the dependent variable $\Delta\tau_{it}$ is a measure of the U.S. MFN bound ad-valorem tariff change during two consecutive multilateral negotiations. He uses detailed data on US tariff reductions during the most recent multilateral trade round to provide the systematic evidence that

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

the US's PTAs were a stumbling block to its multilateral liberalization. Limao deals with the endogenity of MTL and preferential trade liberalization in the above equation.

Baldwin and Seghezza (2008), use the following model[16] (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 endogenity between MFN_{gpm} and PTA_{gpm}.

4 Theoretical Considerations

4.1 Relation with the previous empirical papers

While we draw our motivation from Baldwin and Seghezza (2008), and Limao (2006), we address the *reverse question*, focusing on formation of preferential tariffs of the US, after its MTL program is known. Fugazza and Nicoud (2008) show that products for which the US agreed to cut its MFN tariffs substantially between the end of the Tokyo Round (1979) and Uruguay Round (1994) of GATT negotiations are also the products for which subsequent tariff cuts on a preferential basis are boldest. Our paper differs substantially from Fugazza paper, as we take the US's MTL program as known to the world, by the end of Uruguay Round in 1994 and estimate the impact of MTL on preferential tariff negotiations of the US during 1995 to 2007, whereas Fugazza and Nicoud (2008) focus on the impact of multilateral tariff cuts between the two successive GATT rounds (1979 and 1994) on the preferential margins extended by the US from 1996 to 2007. We take the MFN tariffs as exogenous to the preferential tariffs of the US. To the best of our knowledge, other than our previous paper on the EU, there is no study that has tried to explain empirically the formation of preferential tariffs, once MTL of a country is known to the rest of the world. The important difference from the EU paper is that here we not only use

[16] 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 $v_{gm}=c_g+u_{gm}$.

a different data-set but also use a more sophisticated empirical technique that uses three dimensional panel modeling as compared to the two dimensional panel data used in the EU paper. Rather than making a simplifying assumption that the country (here the US) trades with only two countries – the 'PRF region' and the 'MFN region'; here we take a multi-country approach. This would be more close to the reality and help us to take full advantage of our rich data-set.

4.2 Econometric Model

Interviews with the preferential trade negotiators reveal that when a country negotiates a PTA it takes into account three important factors while deciding the preferential tariffs on goods. First**,** the non-agricultural products are given better preferential access as compared to the agriculture and fisheries products. This fact is also confirmed from Annex III, which gives partner-wise summary of US preferential tariffs as on 2006. Second, in the case of reciprocal PTAs although the US liberalizes at a faster pace than the smaller economy, yet the reciprocity matters may be only to a limited extent. Third, for the products that already have preferential access under non-reciprocal GSP program, the countries seem to be more liberal in allowing the preferential access.

For a given MFN rate, following Baldwin and Seghezza (2008), and Limao (2007) we model the preferential tariff of the US with a simple linear functional form:

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

where, $PRF_{c,z,t}$ is simple average[17] of ad-valorem preferential tariffs applied by the US on import of six digit product *z* from the partner *c* at time *t*. Similarly, $MFN_{z,t}$ is the simple average of MFN applied tariff by the US on imports of product *z* from rest of the world at time *t*. $\Psi_{c,z,t}$ are the other variables that may affect the US decision to apply certain level of preferential tariffs on partner *c'*s products.

[17] The US notifies its tariffs on eight digit products. To ensure harmonization, since we are confining to six digit products, we take simple average of tariff applied on corresponding eight digit products to calculate the tariff on a six digit product. We could have taken a trade weighted average of the preferential tariff on eight digit products but this is not likely to change our estimation results.

As already explained, two important economic variables that may affect the level of preferential tariffs are reciprocity and GSP. Here, we define reciprocity as the extent to which the partner reduces its tariffs when the US offers a certain level of preferential tariff on the partner's products. If the US negotiator follows reciprocity this should lead to lower preferential tariffs for partner *c*. The GSP is a measure of liberalized market access to some non-PTA partners under US GSP program. Therefore, we include them specifically in our simple model (3) to arrive at the following:

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

The effects of reciprocity and the GSP variable can be easily isolated by the above equation. Here, $GSP_{z,t}$ is a dummy variable that is equal to one if the product *z* gets benefit under US GSP scheme at time *t* , otherwise it is equal to zero. In literature, the reciprocity has been defined in terms of first difference (Bhagwati 1991) or change in market access (Limao 2008) [18]. In preferential tariff negotiations, rather than concentrating on the simple difference in the MFN and preferential tariff, the US negotiators focus on market access provided by the partner. Since the US negotiates preferential tariff on a number of products with each partner *c*, the reciprocity $Recp_{c,z,t}$ is measured in terms of change in market access given by the partner. So following Limao (2008) we aggregate the market access on different products and define reciprocity $Recp_{c,z,t}$ as $\frac{1}{(N_t^c - 1)} \sum_{\substack{i=1 \\ i \neq z}}^{i=N_t^c} (-mop_{us,i,t}^c * s_{us,i,t}^c)$, which is the sum of reciprocal preferences extended by partner *c* on all products except *z* at time *t*. Where the margin of preference or *mop* is defined as the difference between the MFN tariff applied by partner *c* on product *z* at time *t* and the preferential tariff applied on US products i.e. $mop_{us,z,t}^c = MFN_{z,t}^c - PRF_{us,z,t}^c$ and $s_{us,z,t}^c$ is the share of the US in partner *c*'s market, which is the ratio of imports of product *z* from the US by partner *c* at time *t* ($M_{us,z,t}^c$) to the total imports of product *z* at time *t* by the same partner ($M_{total,z,t}^c$). In other words, $s_{us,z,t}^c = M_{us,z,t}^c / M_{total,z,t}^c$. Finally, we also normalize the reciprocity variable with the total number of products $(N_t^c - 1)$.

[18] Limao (2008) defines reciprocity in the context of multilateral negotiations $\Delta ma_t^k = \sum_j (-\Delta \tau_{jt}^k) w_{jT}^k$, which is the change in aggregate market access.

The US negotiators may take into account other variables while deciding preferential tariffs. The term $\Omega_{c,z,t}$ captures other variables not included specifically in equation (4). For instance, for some countries the preferential tariffs may be higher; some products may have historically higher preferential tariffs; some years might see higher preferential tariffs etc. In addition, the political economy considerations such as stricter rules of origin for some products; exchange rate movements over the years or the growth in GDP of the partner are also are included in $\Omega_{c,z,t}$. Taking advantage of panel structure of our data set, we can handle these issues easily. Since, we are not interested in estimating the coefficients for any of these variables; we include them as fixed effects by writing the term $\Omega_{c,z,t}$ as sum of three fixed effects D_c, D_z and D_t. Here, D_c is country effect, D_z is product effect and D_t is time effect. With these modifications, we can write the equation (4) as:

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

This helps us to estimate the model without including specific variables and later dealing with the issues raised by these extra variables, such as endogenity, lack of sufficient and comparable product-wise, country-wise periodic data. At the same time, we do not lose any information that is interesting for the present study.

The equation (5) is our baseline model with α_1, β_1 and γ_1 as main parameters of interest. If the high (low) MFN applied tariff leads to high (low) preferential tariff, we should expect α_1 to be positive and significant, but less than one. In case, the US values reciprocity, we should expect β_1 to be positive and significant. This would mean that better reciprocal market access by the partner *c* will lead to lower preferential tariff. If the US 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

We are interested in studying separately the impact of higher and lower MFN tariff on preferential tariffs. We are also interested in studying if the different levels of reciprocal market

access have different impact on preferential tariffs. In other words, we want to test whether the US applies higher preferential tariff on high MFN products or it applies lower preferential tariff on high MFN products. We also want to test, if the higher reciprocal access shown by partner *c* leads to lower preferential tariff or the higher reciprocity does not have any impact on the preferential tariffs. To test these hypotheses we construct four indicator variables:

Dependent variable	**Indicator variables**	**Remarks**[19,20]
$MFN_{z,t}$	$i1_{z,t}$	Equal to one, if the *MFN* tariff on product *z* at time *t* is *smaller* than the cut-off value of *5.3%,* otherwise it is equal to zero.
	$i2_{z,t}$	Equal to one if the *MFN* tariff on product *z* at time *t* is *greater* than the cut-off value of *5.3%,* otherwise it is equal to zero.
$Recp_{c,z,t}$	$ir1_{c,z,t}$	Equal to one, if the reciprocity that the US gets from partner *c* on product *z* at time *t* is *lower* than the cut-off 3.776 , otherwise it is equal to zero.
	$ir2_{c,z,t}$	Equal to one, if the reciprocity that the US gets from partner *c* on product *z* at time *t* is *higher* than the cut-off value of *3.776*, otherwise it is equal to zero.

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

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

The coefficient estimates from equation (6) help us in separating the two effects in MFN and reciprocity variables. As regards the signs and significance of the coefficients, we should expect $\alpha_1 < \alpha_2$, with both α_1 and α_2 to be positive and significant. This will support the initial hypotheses that the US applies comparatively a lower preferential tariff on the products with low MFN tariff and a higher preferential tariff on high MFN products. This shows that the strong political economy forces in some sectors may force the US government to continue providing higher protection even in preferential agreements. For reciprocity variable, we should expect the

[19] The choice of cut-off point is arbitrary. The reason for choosing *5.3%* as cut-off for MFN variable is that the *75%* of the products in our data-set have MFN tariff less than *5.3%* and *99%* of the products have tariff less than *22.75%.* We could have chosen median of MFN variable as the cut-off, but this would not make any difference to our findings.

[20] The choice of cut-off point is again arbitrary. The reason for choosing *3.776* as cut-off is that the *75%* of the observations have reciprocity value less than *3.776* and *99%* of the observations have reciprocity variable less than *9.370*. We could have chosen median of reciprocity variable as the cut-off, but this would not make any difference to our findings.

signs of both β_1 and β_2 to be positive and significant, with $\beta_1 > \beta_2$. Ideally β_2 should be insignificant. This will confirm that the US values reciprocity only up to a limited extent. The reciprocity beyond a limit does not really matter to get lower preferential access to the US market. The key idea is simple to understand. For example, if on some product *z*, the US is not willing to reduce its tariff due to political economy forces (e.g. agricultural products), then a higher reciprocity by partner *c* in that product may not guarantee a lower preferential tariff to the US market. The expectation about the sign and significance of γ_1 remains the same as explained in case of equation (5).

Next we divide the MFN and reciprocity variables into four quartiles each and generate eight indicator variables :

Dependent variable	**Indicator variables**	**Remarks**[21,22]
$MFN_{z,t}$	$i1_{z,t}$	Equal to one, if *MFN* tariff falls in the *first* quarter of MFN tariff applied by the US on all products at time *t*, otherwise it is equal to zero.
	$i2_{z,t}$	Equal to one, if *MFN* tariff falls in the *second* quarter of MFN tariff applied by the US on all products at time *t*, otherwise it is equal to zero.
	$i3_{z,t}$	Equal to one, if *MFN* tariff falls in the *third* quarter of MFN tariff applied by the US on all products at time *t*, otherwise it is equal to zero.
	$i4_{z,t}$	Equal to one, if *MFN* tariff falls in the *fourth* quarter of MFN tariff applied by the US on all products at time *t*, otherwise it is equal to zero.
$Recp_{c,z,t}$	$ir1_{c,z,t}$	Equal to one, if reciprocity by partner *c* on product *z* at time *t* is in the *first* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.
	$ir2_{c,z,t}$	Equal to one, if reciprocity by partner *c* on product *z* at time *t* is in the *second* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.
	$ir3_{c,z,t}$	Equal to one, if reciprocity by partner *c* on product *z* at time *t* is in the *third* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.
	$ir4_{c,z,t}$	Equal to one, if reciprocity by partner *c* on product *z* at time *t* is in the *fourth* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.

[21] The interacted MFN variables are denoted as *MFN_i1, MFN_i2, MFN_i3* and *MFN_i4* in regression results. The upper cut-off points for variables *MFN_i1, MFN_i2* and *MFN_i3* are 2.5%, 5.3% and 14.19% respectively. The tariff above 14.19% is captured by *MFN_i4* .

[22] The interacted reciprocity variables are denoted as *Recp_i1* and *Recp_i2* in regression results. The upper cut-off points for *Recp_i1, Recp_i2,* and *Recp_i3* are *1.024, 3.776 and 9.013* respectively. The reciprocity above *9.013* is captured by *Recp_i4.*

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

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

5 Data

We focus on the period 1995 to 2007 i.e. 13 years since the WTO Agreement came into being. The formation of WTO saw exceptional growth in the number of PTAs. The number of PTAs notified to the GATT was 91 till 1994. By the end of 2007, there were more than 200 notified PTAs. The US notified nine[23] PTAs during the period 1995 to 2007. In addition, the US had instituted a GSP scheme on January 1, 1976, for a ten-year period. It has been renewed periodically since then; most recently, the US Congress has authorized GSP through December 31, 2009. Moreover, the period 1995 to 2007 is large enough to study the preferential liberalization program of the US. This also allows us to exploit the country-wise, product-wise and year-wise variations in tariff preferences.

5.1 Data Requirement

Countries have harmonized tariff codes under the World Customs Organization (WCO). In the 'Harmonized System', the first six digits of product classification are same for all the countries. Beyond six digits, the countries are free to have further disaggregation of products as per their national requirements. Therefore, for cross country comparison, we use 'Harmonized System' or HS product classification up to six digits.

[23] Jordan (2001), Chile (2004), Singapore (2004), Australia (2005), Morocco (2006), Bahrain (2006) and the Dominican Republic - Central America - United States Free Trade Agreement (CAFTA-DR) consisting of El-Salvador (2006), Nicaragua (2006), Honduras (2006), Guatemala (2006), Dominican Republic (2007).

To estimate the coefficients of interest in equations (5) to (7), we need data for the US and its partners. Since we are interested in studying tariff variation across partners, time and products, we need to set up a three dimensional data-set. In respect of the US, we need partner-wise year-wise preferential tariff applied on six digit products. The other product-wise, year-wise data that we need is the MFN applied tariff by the US. We also need year-wise list of the US GSP products. In respect of PTA partners, we need year-wise product-wise tariff and import data to construct the reciprocity variable. Specifically, for each partner, we need preferential tariff on the US products and the MFN applied tariff on rest of the world. We also need each partner's year-wise global imports and imports from the US on six digit products.

5.2 Data Sources

The major source of data for this study is the World Bank's World Integrated Trade Solution (WITS) database and the WTO's Regional Trade Agreement Information System (RTA-IS)[24].

5.2.1 The US Related Data

The US preferential and MFN tariff data is electronically available for years 1995 to 2007 on four different HS classifications[25] from TRAINS (Annex VI). We convert tariff data from these classifications to one common classification. Since, for most of the years the data is on HS 1996, we choose HS 1996 as common classification to estimate the results. The dependent variable in our model $PRF_{c,z,t}$ is the preferential tariff applied by the US on country *c*'s six digit product *z* at time *t* . This data is taken directly from TRAINS database. The independent variables, we need are $MFN_{z,t}$, $GSP_{z,t}$ and $Recp_{c,z,t}$. Here, $MFN_{z,t}$ is the simple average of the US MFN tariff on six digit product *z* at time *t* and $GSP_{z,t}$ is a dummy variable that is equal to one if the product *z* gets benefit under US GSP scheme at time *t* , otherwise it is equal to zero. Data on $MFN_{z,t}$ and $GSP_{z,t}$ is obtained directly from TRAINS but we have to construct data on the reciprocity variable

[24] 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.

[25] The US'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 US'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.

($Recp_{c,z,t}$) using partner's data-set. The construction of this variable is a major contribution of this paper so in the next sub-section we discuss it in some detail.

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

The final variable we need before we start estimating equations (5) to (7) is reciprocity $Recp_{c,z,t}$. Sub-section 4.2 defines $Recp_{c,z,t}$ as $\frac{1}{(N_t^c - 1)} \sum_{\substack{i=1 \\ i \neq z}}^{i=N_t^c} (-mop_{us,i,t}^c * s_{us,i,t}^c)$. To construct this variable, we need partner-wise, year-wise and product-wise data on four variables -- $MFN_{z,t}^c$, $PRF_{us,z,t}^c$, $M_{us,z,t}^c$ and $M_{total,z,t}^c$. The availability of data is attached at Annex VII[26] and VIII.

First, we need data on partner *c*'s MFN applied tariff i.e. $MFN_{z,t}^c$, which is the simple average of partner *c*'s applied tariff on six digit product *z* in year *t*. Second, we need data on preferential tariff applied by partner *c* on US product *z* in year *t* i.e. $PRF_{us,z,t}^c$. Out of 13 partners, for five partners[27], the data is available from TRAINS and IDB database. For other eight partners[28], we do not have sufficient data from these sources; therefore, we calculate the preferential tariffs applied by these eight partners on the US by carefully codifying the tariff liberalization schedule from the legal text[29] of PTAs. Third, we need data on preferential imports by partner *c* from the US, i.e. $M_{us,z,t}^c$. For 12 partners[30] the data is available from COMTRADE and for two partners[31] from TRAINS or IDB. Fourth, we need data on global imports by partner *c* i.e. $M_{total,z,t}^c$. The data

[26] Similar to the US 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.

[27] Australia (2006-2007), Bahrain (2007), Canada (1996-2007), Israel (2004-2007) and Morocco (2006-2007).

[28] Guatemala (2006-2007) , Honduras (2006-2007), Nicaragua (2006-2007), El-Salvador (2006-2007), Mexico (1995-2007), Chile(2004-2007), Jordon (2001-2007) and Singapore (2004-2007).

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

[30] Bahrain (2006-2007), Guatemala (2006-2007), Honduras (2006-2007), Nicaragua(2006-2007), El-Salvador (2006-2007), Mexico (1996-1998, 2000, 2003, 2007), Australia(2005-2007), Chile(2004-2007), Israel(2004-2007), Jordan(2001-2007), Morocco (2006-2007), Singapore (2004-2007).

[31] Trains: Canada (1997-2007), Mexico (1995, 1999, 2002, 2004-2006); IDB : Canada(1996), Mexico (2001).

for five PTA partners[32] is available from COMTRADE and for 15 partners[33]from TRAINS and IDB. Using both these sources, we complete the global import data.

With data on four variables, we can easily calculate the margin of preference ($mop^{c}_{us,z,t}$) as the difference between MFN and preferential tariff. Similarly, we can also calculate the share of the US product *z* in partner *c*'s market i.e. $s^{c}_{us,z,t} = M^{c}_{us,z,t} / M^{c}_{total,z,t}$. Finally, using $s^{c}_{us,z,t}$ and $mop^{c}_{us,z,t}$ we construct the reciprocity extended by partner *c* on product *z* in year *t* i.e. $Recp_{c,z,t}$. It is important to note that N^{c}_{t} is the number of products in year *t* for partner *c* in the data-set.

6 Key Econometric Issues

6.1 Endogenity - MFN and preferential tariffs

We have taken the MFN tariff as exogenous to the preferential tariff. Some authors have argued that the MFN tariff may be endogenous to the preferential tariff, giving rise to the reverse causality flowing from preferential tariff to the MFN tariff. This should make us cautious in interpretation of results from estimation of equations (5) to (7). In the given setting that is particular for the US, we argue in the next two paragraphs absence of endogenity on account of MFN variable.

By the end of the Uruguay Round (1994), the bound rates commitments of the US were known to the rest of the world. This coupled with the fact that the US applied tariffs on almost all the products are same as its bound tariffs, in retrospect confirms that the US applied MFN rates were known to its trading partners by the end of 1994. In all the PTAs, the tariff reduction schedule of the US is based on an agreed base rate[34].

For concreteness, let us take the example of the *US- Jordan Agreement* (2001), in which both the partners have agreed to progressively eliminate tariffs on goods in accordance with Annex 2.1[35]

[32] Bahrain (2006-2007), Guatemala (2006), Nicaragua (2006), Mexico (1996), Morocco (2006-2007).
[33] Trains: Guatemala (2007), Honduras (2007), Nicaragua (2007), El-Salvador (2006-2007), Canada (1995-2007), Mexico(1995, 1997-2006), Australia(2005-2007), Chile(2004-2007), Israel(2004-2007), Jordan(2001-2003, 2005-2007), Singapore (2004-2007). IDB : Honduras (2006), Mexico (2007), Israel (1999-2003), Jordan (2004).
[34] For most of the US 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.
[35] http://www.ustr.gov/trade-agreements/free-trade-agreements/jordan-fta/final-text

attached with the agreement. The goods have been classified under staging categories A to M in both parties' schedule. The schedule specifies a 'base rate' for each product from which the tariffs are to be eliminated in equal annual stages as per the specified category. The 'base rate' for the *US- Jordan Agreement* reflects the MFN rates of duty applied on June 8, 2000. The maximum period in which the duties are to be eliminated is 10 year. In other words, the preferential tariffs are specified as *x%* of the 'base rate'. For agricultural products, the maximum quantity that can be preferentially imported has been also fixed by both the partners. As the US bound rates, hence applied MFN rates were known before the PTA was signed, it is clear that the MFN applied tariff affects the US preferential tariff, but the reverse is not true. Therefore, we conclude that there is no case for reverse causality from preferential tariffs to MFN tariffs in our estimation equations.

6.2 Endogenity - Reciprocity variable and preferential tariffs

Literature, suggests that *second cause* of reverse causality could be that the preferential tariffs ($PRF_{c,z,t}$) may affect the reciprocity variable ($Resp_{c,z,t}$). To appreciate the endogenity issue in we rewrite equation (5):

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

$PRF_{c,z,t}$ is the dependent variable, which depends on five variables, with $c= 1,\ldots.. k$, $z=1,\ldots.N$ and $t=1,\ldots..T$. If the regression error $\varepsilon_{c,z,t}$ is correlated with $Resp_{c,z,t}$ and uncorrelated with other variables then OLS/FE estimators are inconsistent and there is a problem of endogenity. In that case, we have to tackle endogenity with proper instruments using instrument variables (IV) regression[36]. But if the error term $\varepsilon_{c,z,t}$ is uncorrelated with $Resp_{c,z,t}$ and other variables, we can estimate the equation (5) using the OLS or FE methods without using the instruments. However, in case $Resp_{c,z,t}$ is exogenous and we treat it as endogenous, then the IV estimate is still consistent, but they can be much less efficient than the OLS or FE estimators. So we should be careful in determination of endogenity or exogenity of $Resp_{c,z,t}$.

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

In the following paragraphs, we analyze this issue in detail and argue absence of reverse causality due to reciprocity variable.

We know that the PTAs are agreed as a package between the partners, in which there are commitments from both sides on tariff elimination, rules of origin, sanitary and phytosanitary measures, services, financial services, government procurement, current payments and capital movement etc. The deals are struck by exchanging concessions in complementary areas. If we closely examine the tariff reduction schedule of any PTA, we find that the exchange of concessions is not on *'one-to-one'* basis. The US exchanges preferences for the products that it can export to the partner. Similarly, the PTA partner is interested in getting preferential treatment on the products that it can export to the US. In other words, the exchange of preferences is not *'apples with apples'*, but *'apples with oranges'*. Additionally, the US being the larger partner liberalizes at a faster pace[37]. The smaller partners are expected to reduce tariffs in an extended period sometimes up to 10 years. Further, if we look at the definition of reciprocity variable $Recp_{c,z,t}$ as defined in sub-section 5.2.2 , it shows that the preferential tariff for product *z* depends on the reciprocal market access on all the products except the product *z*. Due to all these reasons, the scope for endogenity gets further diluted.

In brief, we conclude that there is no problem of endogenity on account of $PRF_{c,z,t}$ variable vis-à-vis either $MFN_{z,t}$ or $Resp_{c,z,t}$ variable and we can estimate equations (5) to (7) using OLS and FE estimation methods.

7 Empirical Results

7.1 Estimation Results

The results of estimating equations (5), (6) and (7) are reported in Table 1[38]. Each entry of the table reports the estimated coefficients and standard errors clustered at the product level. A

[37] Such asymmetrical liberalization is common in PTAs involving a large and a small economy and is often referred as '*less than full reciprocity*' in negotiating parlance.

[38] In *column 1* and *2*, *MFN_i1* denotes the MFN variable. In *column 3* dependent variables MFN*_i1* and *MFN_i2* denotes MFN tariffs below and above *5.3%* , respectively . *Recp_i1* denote reciprocity variable in *column 1* and *2*. In *column 3* and *6,* the dependent variables *Recp_i1, Recp_i2* denote reciprocity below and above the cut-off level of *3.776*. Similarly, *MFN_i1, MFN_i2, MFN_i3* and *MFN_i4* denote the four quarters of MFN tariff in *column 4 to 7* and *Recp_i1, Recp_i2, Recp_i3 and Recp_i4* denote the four quarters of reciprocity variable in *column 7*. The four

natural way to start is a pooled OLS regression using data for all products in all years. Using pooled OLS, in *column 1* we estimate equation (5). The *column 2* estimates equation (5) using FE model; while *column 3* estimates equation (6). In *column 4*, we control for four quarters of MFN tariffs only. In *column 5*, we control for four quarters of MFN tariff and the variable *GSP*. In *column 6*, we control for four quarters of MFN tariff, two levels of the variable reciprocity and the variable *GSP*. Finally, in *column 7*, we estimate equation (7) by controlling for four quarters of MFN tariff, four quarters of reciprocity variable and the variable *GSP*. In subsequent paragraphs, we discuss in detail the results of *column 1 to 7*.

In *column 1* specification, the data is available for 351,510 year-country-product observations. The number of dependent variables is 27 as we also control for the year and partner dummies. However, because of missing observations on MFN tariff data, the number of observations used in regression is 295,203. The estimated coefficient for MFN tariff is positive (*0.221*) and significant, a result that supports the hypothesis that higher (lower) MFN tariffs would lead to higher (lower) preferential tariffs. The reciprocity coefficient is positive and significant supporting the hypothesis that reciprocity matters. The estimated coefficient for *GSP* variable is negative and significant, supporting that the US values non-reciprocal preferences while deciding preferential tariffs. However, the consistency of OLS[39] estimates require that the composite error term is uncorrelated with the dependent variables, but OLS ignores any heterogeneity over products and country. For our data set, it is highly unlikely that the product and country specific effects D_z and D_c are uncorrelated with the $MFN_{z,t}$, $Recp_{c,z,t}$ or $GSP_{z,t}$ variables. Hence, the pooled OLS is inconsistent and we estimate (5), (6) and (7) using the FE model in *column 2 to 7*.

In *column 2*, we estimate the baseline model (5) taking advantage of panel structure of our dataset. Again, the data is available for 5113 products for 13 years (1995 to 2007) for 13 countries. However, because of missing observations, the number of observations used in the

quarters are divided on percentile of observations, the cut-offs being – the first quarter 50 percentile, the second quarter 75 percentile, the third quarter 95 percentile and the fourth quarter 100 percentile.

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

regression is 295,203. According to these estimates, the coefficient for MFN tariff is positive (*0.122*), and highly significant. The estimate of reciprocity coefficient is also significant, and positive. These estimates support our initial hypothesis the US protects highly MFN protected products even at the regional level. The reciprocity matters again in regional agreements for the US. In addition, the GSP coefficient also remains negative and significant. The impact of higher and lower MFN tariffs can be isolated only when we separate higher and lower MFN variables in *columns 3 to 7*.

In *column 3*, we control for higher and lower MFN tariff, higher and lower values of reciprocity, and the variable *GSP*. Here the cut off for the two MFN values is *5.3%*. The coefficient for the higher MFN tariff (*MFN_i2*) is positive and highly significant, while the coefficient for the lower MFN tariff (*MFN_i1*) is insignificant . This implies that for MFN tariff up to *5.3%,* the preferential tariff does not vary with increase in MFN tariff, whereas if the MFN tariff is higher than the cut off, then the preferential tariff increases with increases in MFN tariffs. Again supporting our initial hypothesis that preferential tariff for higher MFN values are higher and the preferential tariffs for the lower MFN values are lower.

The coefficients for both[40] the reciprocity variables are positive and highly significant. The coefficient for lower reciprocity variable is *0.450* and for higher reciprocity is *0.042*. This has two clear implications. First, as expected, the reciprocity matters. Second, it matters more in the lower quarters of reciprocity. Put differently, it supports the hypothesis that the reciprocity matters but only up to a limited extent. The logic is simple to understand. For example, if the US protects some agricultural product *z* in favour of the domestic producers then a higher reciprocal market access by a partner *c* on the same agricultural product *z* may not be very interesting from the US's point of view to induce the US to reduce preferential tariff on product *z*.

The coefficient for *GSP* variable is *-0.161* and highly significant, which implies that if a product gets GSP, then its preferential tariff is lesser by *0.161* percent as compared to the products that do not get GSP. This supports the initial hypothesis that GSP matters in deciding preferential tariffs. The idea is again simple to understand. The GSP preferences are non-reciprocal by definition and the tariffs on GSP products are either zero or very close to zero. Since, the US has

[40] The cut-off value for higher reciprocity is *3.776,* which is 75% percentile of the reciprocity variable.

already lowered its tariffs on GSP products for few developing countries; it can easily reduce tariffs on the same products for its PTA partners without incurring any additional costs.

The next few columns in Table 1 show the estimates after controlling for different variables of our interest. These coefficients provide consistent estimates of coefficients of our interest. Since, the final column in Table1 controls for all the four quarters of $MFN_{z,t}$ and $Recp_{c,z,t}$ variables, in the next paragraph, we discuss the results of *column 7* in detail.

In *column 7*, the estimated coefficients for *MFN_i1, MFN_i3* and *MFN_i4* are positive and highly significant, whereas the coefficient for *MFN_i2* is insignificant although positive. To understand the implications of these coefficients, let us consider the upper cut-off for the first three quarters. The upper cut-off values for variables *MFN_i1, MFN_i2* and *MFN_i3* are *2.5%, 5.3%* and *14.19%* respectively. A coefficient of *0.069* for *MFN_i1* implies that keeping other variables constant, if the MFN tariff in the first quarter increases by one percent; the US preferential tariff increases by *0.069* percent. In other words, for the products having MFN tariff in the first quarter, the preferential tariff increases slightly as the MFN tariff increases. The coefficient of *0.129* for *MFN_i3* implies that for MFN tariffs in the third quarter, the US increases preferential tariff by *0.129* percent for one percent increase in MFN tariff. But when the MFN tariffs are in the fourth quarter (*MFN_i4*), the coefficient is *0.122*, which is almost equal to the coefficient for *MFN_i3*. This implies that as the MFN tariff becomes higher, the preferential tariff also becomes higher. In addition, the increase in preferential tariff is more, if the MFN tariff falls in higher quarters. One interesting fact to be noticed from the coefficient of *MFN_i2* is that in the second quarter there is no effect of increase in MFN tariff on the preferential tariff. In sum, the estimated coefficients on four quarters of MFN tariff confirm our initial hypothesis that the products, which are highly protected at MFN level, also have higher preferential tariffs.

As regards the coefficients for reciprocity variables are concerned, all the four coefficients (*Recp_i1* to *Recp_i4*) are positive and significant. The cut-offs for *Recp_i1, Recp_i2,* and *Recp_i3* are *1.024, 3.776* and *9.013* respectively. A one percent more reciprocity by the partner, when the reciprocity falls in the first quarter, would lead to reduction in preferential tariff by *1.803* percent. For reciprocity in the second quarter, one percent more reciprocity by the partner

will lead to reduction in preferential tariff by *0.351* percent point. However, when the partner shows more reciprocity i.e. when the reciprocity is in the third quarter, one percent more reciprocity will lead to *0.062* percent reduction in preferential tariff. In other words, in the higher (third) quarter, the reduction in preferential tariff is smaller as compared to the products for which the reciprocity offered is in the first two quarters. All the first three reciprocity coefficients are positive and highly significant.

We would expect the coefficient for the fourth quarter (*Recp_i4*) to be insignificant or at least smaller than the coefficients for other three quarters, but interestingly this is not the case here. The coefficient for the fourth quarter is *0.596*, which is significant but not so strongly as the first three coefficients and it is more than the coefficients for *Recp_i2* and *Recp_i3*. Nevertheless, there is different response to reduction in preferential tariff for different quarters of reciprocity. The initial reciprocity has a higher impact on preferential tariff reduction. But as the reciprocity increases, it has lesser and lesser impact, but when the partner shows extreme reciprocity it again has a comparatively higher effect on tariff reduction.

The estimated coefficient for *GSP* variable remains negative and highly significant as in *column 3*. This again supports the view that GSP matters in deciding the preferential tariffs. The implications and interpretation also remain the same as already discussed above for column *3*.

7.2 Extensions and Additional Results

In this sub section, we corroborate our initial hypothesis (i.e. the higher MFN tariff leads to higher preferential tariffs) by separating the products into two sectors –agricultural[41] and industrial[42]. The US applied average MFN tariff is *3.9%* on industrial products and *8.9%* on agricultural products. In Table 2, we re-estimate equations (5), (6) and (7). Each entry of Table 2 reports the estimated coefficients and standard errors clustered at the product level. In *column 1 to 4*, we control for four quarters of MFN tariff on agricultural and industrial products separately. We construct eight indicator variables, four each for agricultural and industrial products. The

[41] 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.

[42] 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.

technique of creating the indicator variables is the same as in previous sub-section; with the difference that, here we divide the agricultural and industrial products separately[43] into four quarters.

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

The coefficient for the first quarter of agricultural sector is insignificant implying that for products with MFN tariffs in the range *0% to 1.42%,* the preferential tariffs does not depend on the MFN tariff. Interestingly, for the second quarter, the coefficient *0.071* is negative and significant at *5%* level, implying that in the MFN tariff range *1.42% to 5.4%,* the preferential tariff decreases with the increase in MFN tariff. The coefficients for the third and fourth quarters are positive and highly significant. For the third quarter, as the MFN tariff increases by one percent, the preferential tariff increases by *0.173* percent, whereas for the fourth quarter one percent increase leads to *0.123* percent increase in preferential tariff. In other words, the responses of the US in deciding preferential tariff are different for the four quarters of agriculture sector. In the lower MFN tariff quarters, the preferential tariff decreases with increase in MFN tariffs whereas in the higher MFN quarters the preferential tariff increases as the MFN tariff increases. This confirms our initial hypothesis that products with higher MFN tariff have higher protection in the US market.

[43] The four quarters are divided on percentile of observations, the cut-offs being – the first quarter 50 percentile, the second quarter 75 percentile, the third quarter 95 percentile and the fourth quarter 100 percentile. With the result, we have four quarters of MFN agricultural tariff as *MFN_af_i1* (*0%-1.42%), MFN_af_i2(1.42%-5.4%), MFN_af_i3* (*5.4%-18.14%)* and *MFN_af_i4* (above *18.14%)*; the upper limits are included in all the four ranges. Further we generate four indicator variables $af\_i1_{z,t}, af\_i2_{z,t}, af\_i3_{z,t}, and\ af\_i4_{z,t}$. The indicator variable $af\_i1_{z,t}$ is equal to one, if $MFN_{z,t}$ falls in the first quarter of MFN applied tariffs in year *t*, otherwise $af\_i1_{z,t}$ is zero. The indicator variable $af\_i2_{z,t}$ is equal to one, if $MFN_{z,t}$ falls in the second quarter of MFN applied tariff in year *t*, otherwise $af\_i2_{z,t}$ is equal to zero. The other two indicator variables are defined accordingly. We interact these variables with $MFN_{z,t}$ to construct *MFN_af_i1, MFN_af_i2, MFN_af_i3* and *MFN_af_i4* . Based on same cut offs percentiles, similarly we define four quarters for the industrial sector. The four quarters for industrial tariffs are *MFN_na_i1(0%-2.63%) , MFN_na_i2(2.63%-5.3%), MFN_na_i3(5.3%-13.8%*) and *MFN_na_i4* (above *13.8%).* The upper limits are again included in the four ranges.

For industrial products, we notice a slightly different relationship. The coefficient for the first quarter is *0.083* and it is highly significant, implying that for the tariff range *0%* to *2.63%,* as the MFN tariff becomes higher, the US slightly increases the preferential tariff. For the second quarter the coefficient is insignificant, implying that the preferential tariff remains constant[44] at *2.527.* In the third quarter*,* we again notice an increasing trend in preferential tariffs as the MFN tariffs increases. With one percent increase in MFN tariff, the preferential tariff increases by *0.124%.* For the last quarter, the coefficient is again insignificant; implying that when the MFN tariff is above *13.8%*, the preferential tariff is unaffected with the increase in MFN tariff. This shows that in the lower quarters of MFN tariff, the preferential tariff is lower as compared to the preferential tariff in the higher quarters.

The estimated coefficients for four reciprocity variables (*Recp_i1* to *Recp_i4*) are positive and highly significant. The sign and magnitude of these coefficients remains the same as in Table 1, therefore, we do not discuss their interpretation again. Similarly, the coefficient for the variable *GSP* is again negative and highly significant, implying that the GSP matters, when the US decides the level of preferential tariffs.

Overall, we conclude that the US gives more preferential access on products with lower MFN tariff. The products with higher MFN tariff get lower preferential access. Reciprocity is another factor that decides the level of preferential tariffs. The US has different responses depending on the level of reciprocity shown by the partner. The initial reciprocity shown by the US partners has greater impact on reduction of preferential tariffs. But as the reciprocity increases, it becomes a less effective tool for US partners to get better preferential access to the US market. However, when the reciprocity shown is in the highest quarter, it again has a better effect on tariff reduction. In case a product is covered under the GSP, its preferential tariff is smaller compared to a similar product that does not get GSP benefit. In short the results in Table 2, support our two initial hypotheses.

[44] The constant term for column 4 is *2.641*, and the coefficient for *na_i2* is *-0.114*. Both these coefficients are highly significant.

7.3 Sensitivity Analysis

We now test the sensitivity of our estimates and do additional robustness tests. We consider an alternative sample of data. We re-estimate equations (5), (6) and (7) using data only for the US's developing country partners[45]. The results are reported in Table 3 with each entry again reporting the estimated coefficients and clustered standard errors. *Column 1* reports the OLS estimates of equation (5). Next six columns estimate the fixed effect model, taking advantage of panel structure of the data-set.

We find consistent estimates, which are similar in sign and significance to the earlier estimates in Table 1. Since, the *column 7* contains all variables of our interest; we compare these estimates with *column 7* of Table 1. The coefficients for all the quarters, except the second quarter of MFN tariff have similar sign and significance as in Table 1. The coefficient for the second quarter though different in sign, is insignificant in both the tables.

For the first quarter of MFN tariff, the coefficient is *0.105* and it is highly significant; implying that keeping other variables constant, with one percent increase in MFN tariff the preferential tariff increases by *0.105* percent. For the third and fourth quarters, the coefficients are *0.173* and *0.108* respectively. This implies that within these quarters, the preferential tariff increases as the MFN tariff increases, but the preferential tariff increases more in the third quarter for a given increase in MFN tariff. In addition, the preferential tariff for the second quarter does not seem to depend on the level of MFN tariff in both the tables. Therefore, Table 3 results corroborate the results of Table 1, confirming again our initial hypothesis that the highly protected products at the MFN level get higher protection even at the preferential level.

Comparing the coefficients for four quarters of reciprocity, we find similar sign and significance as in Table 1, with highly significant coefficients for the first three quarters of reciprocity variable. Again as in Table 1, the coefficient for the fourth quarter is *1.141*, which is weakly significant but at the same time more than the coefficients for *Recp_i2* and *Recp_i3*. Moreover

[45] The US signed its first PTA with Israel in 1985. The other developing countries having PTA with US during the period 1995 to 2007 are Bahrain (2006), Guatemala (2006), Honduras (2006), Nicaragua (2006), El-Salvador (2006), Mexico (1994), Chile (2004), Jordan (2001), Morocco (2006), Singapore (2004). Therefore, we drop Canada (1994) and Australia (2005) from our original data-set to construct the sample of developing countries.

the coefficients for the first three quarters are in descending order[46] in terms of their values. This again shows that there is different response from the US for different levels of reciprocity. As earlier was the case in Table 1, with the increase in value, the reciprocity plays a smaller role in getting preferential access to the US market, but the extreme reciprocity by the partner again has a comparatively higher effect on tariff reduction. The hypothesis of 'limited reciprocity matters' in US preferential tariffs is again confirmed from Table 3.

The sign and significance of the *GSP* coefficient is again the same as in case of Table 1.

Finally, to corroborate the results of Table 2, we re-estimate equations (5), (6) and (7) for the developing country sample in Table 4. As before, we control for four quarters[47] of MFN tariff separately for agricultural as well as industrial products. We get consistent estimates for the coefficients of our interest. Since *column 4* contains all the variables of our interest, we now discuss it in detail and compare the results with the corresponding results of Table 2.

For agricultural sector, the coefficient for the first quarter is insignificant, implying that for the MFN tariff in the range *0%-1.42%* , the preferential tariff does not depend on MFN tariff. The coefficient for the second quarter is negative and significant (*-0.105*), i.e. for the range *1.42%-5.39%,* the preferential tariff decreases with increase in MFN tariff. The estimates for the next two quarters are both positive and highly significant. This shows that the US is liberal in granting preferential access, when the tariffs are comparatively lower i.e. below *5.39%*. However, when the MFN tariffs are higher i.e. above *5.39%*, the US applies a less liberal regime and the preferential tariff increases more for a given increase in the MFN tariff. Therefore, in the agriculture sector the higher MFN tariffs will generally lead to higher preferential tariffs. In short, we observe similar response to the preferential tariff formation on account of different levels of the MFN tariffs as we observed previously in Table 2.

[46] The coefficient for *Recp_i1* is higher than coefficients for *Recp_i2* and *Recp_i3.* The coefficient for *Recp_i2* is higher than the coefficient for *Recp_i3* and the coefficient for *Recp_i4* is almost insignificant.

[47] We divide the year-wise MFN tariff on agricultural products into four quarters (*0%-1.42%, 1.42%-5.39%, 5.39%-18.13%* and above *18.13%*; the upper limits are included in the four ranges). Four indicator variables are defined accordingly. We interact these variables with $MFN_{z,t}$ to construct *MFN_af_i1, MFN_af_i2, MFN_af_i3* and *MFN_af_i4*. Similarly, we construct *MFN_na_i1, MFN_na_i2, MFN_na_i3* and *MFN_na_i4* for the industrial sector. The four quarters for industrial tariffs are: *0%-2.60%, 2.60%-5.3%, 5.3%-13.6%* and above *13.6%.* Again, the upper limit in each quarter is included in four ranges.

For industrial products, coefficient for the first quarter *(0.113),* is positive and highly significant, which implies that in the range *0% - 2.6%*, when the MFN tariff increases the preferential tariff also increases. But the tariffs in this quarter are already so low that it would not affect the real market access of partners. When MFN tariffs are in the second quarter, we note a different trend. The coefficient is not significant; this implies that the preferential tariff remains constant at *2.92*[48]. The coefficient for the third quarter is *0.204*, which is positive and highly significant, showing again that in the tariff range *5.3% - 13.6%*, the preferential tariff increases with increase in the MFN tariff. But for the fourth quarter the coefficient is not significant, implying that the preferential tariff does not depend on the MFN tariff. These coefficients are again similar to the corresponding coefficients in Table 2, implying that if the MFN tariff is lower on an industrial product, it is likely to get more preferential access (i.e. lower preferential tariff) ,whereas the product with higher MFN tariff is likely to have less preferential access (i.e. higher tariff). The interpretation of coefficients on different MFN quarters further strengthens our hypothesis that the US extends better preferential access on products with lower MFN tariffs.

The estimated coefficient for the first quarter of reciprocity is *1.917*, which is positive and highly significant. The coefficients for the next two quarters are also highly significant, but smaller than *1.917*, showing that the increased reciprocal market access by the partners has lesser impact on tariff reduction in the US market. However, when the reciprocity is in the highest quarter, the coefficient (*1.144*) is higher than the coefficients for the previous two quarters. Hence, we arrive at the same conclusions about significance of reciprocity variable as in Table 2. In short, this again shows that higher reciprocity by the partner does not necessarily matter, but the reciprocity matters only up to a certain level in getting better preferential access to the US market.

The coefficient for *GSP* variable is again significant confirming our earlier finding that when the US negotiates with developing countries, it takes into account whether the product gets GSP or not.

[48] The constant term for column 4 is *1.582*, and the coefficient for *na_i2* is *0.274*. Both these coefficients are highly significant.

8 Conclusion

In this paper, we focus on the main ingredients of the preferential tariff formation of the US by analyzing the impact of multilateral trade liberalization on the post-Uruguay Round US PTAs (1995-2007) which is the reverse question of Bhagwati's (1991) 'classic question' (Are PTAs a building block or stumbling block to the MTL?).

We have shown empirically that when the US negotiates a PTA, the preferential tariff depends on three measurable quantities – MFN applied tariff, reciprocity by the partner, and the GSP program.

The US allows lower preferential tariff on the products having lower MFN tariff and comparatively higher preferential tariff on high MFN products. This fact gets clearer when we divide the MFN variable into two halves or four quarters. When we further divide the sample into agricultural and industrial products, we find similar empirical results. Compared to industrial products, the agricultural products are more protected even at the regional level. The sample of developing countries also confirms this finding.

The reciprocity by the PTA partners is also important from the US point of view, but higher reciprocity does not always ensure high preferential access. It is clear from our empirical estimation that there are different responses of the US on different levels of reciprocity. In the lower quarter the reciprocity has a higher contribution in reduction of MFN tariff and as the reciprocity goes higher, it has a diluted impact on reduction in MFN tariff. In case of extreme reciprocity again there is some effective impact to get lower preferential tariff.

Another aspect of preferential tariff that is clearly brought out in this paper is that the non-reciprocal preferences under the GSP program always matter. All the empirical results have consistently showed that once the US has already given the GSP benefit on some products to non-PTA partners, it is easier to liberalise on the same products in a PTA.

Using a unique and extensive historical data-set for fourteen US PTAs, constructed for this paper, we have been able to confirm the above results empirically. It is useful to point out that due to non-availability of data on preferential tariffs applied by partners in eleven US PTAs; we have had to carefully translate the legal texts into data. Further, to the best of our knowledge,

with the exception of Fugazza and Nicoud (2008), there is no other empirical paper that takes the MFN tariff as exogenous to the preferential tariffs and looks into the preferential tariff formation once MTL program of the US is known to its trade partners. Fugazza and Nicoud (2008) study the impact of multilateral tariff cuts on the preferential margins between the two successive GATT rounds (Tokyo and Uruguay). On the other hand, taking the MTL program of the US as a given we focus on post - Uruguay preferential tariff cuts during 1995 to 2007. Interestingly, our key finding that in PTAs the US liberalises more on lower MFN tariff products supports Fugazza and Nicoud (2008), which concludes that the US puts a lower preferential tariff on the goods for which it had cut the MFN tariff the most between the two WTO rounds.

9 References

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Table 1

The Determinants of US's Preferential Tariff (all partners)

	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)
PRF#	(1) OLS	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE	(7) FE
MFN_i1	0.221***	0.122***	0.022	0.022*	0.069***	0.069***	0.069***
	(0.020)	(0.014)	(0.011)	(0.009)	(0.012)	(0.017)	(0.017)
MFN_i2			0.125***	0.030**	0.026*	0.012	0.013
			(0.015)	(0.010)	(0.010)	(0.013)	(0.013)
MFN_i3				0.096***	0.094***	0.129***	0.129***
				(0.013)	(0.013)	(0.016)	(0.016)
MFN_i4				0.134***	0.134***	0.122***	0.122***
				(0.017)	(0.017)	(0.016)	(0.016)
Recp_ir1	0.074***	0.072***	0.450***			0.450***	1.803***
	(0.006)	(0.006)	(0.021)			(0.021)	(0.072)
Recp_ir2			0.042***			0.042***	0.351***
			(0.006)			(0.006)	(0.018)
Recp_ir3							0.062***
							(0.009)
Recp_ir4							0.596**
							(0.200)
GSP	-0.301***	-0.262***	-0.161***		-0.114***	-0.187***	-0.187***
	(0.018)	(0.022)	(0.020)		(0.021)	(0.025)	(0.025)
Constant	1.358***	1.891***	2.345***	1.737***	1.743***	2.266***	2.621***
	(0.108)	(0.105)	(0.098)	(0.075)	(0.075)	(0.092)	(0.103)
N	295203	295203	295203	345763	345763	295203	295203
N_g		5113	5113	5113	5113	5113	5113
F	154.290	85.650	78.763	74.667	74.090	72.189	70.445
rho		0.374	0.376	0.336	0.336	0.370	0.371
r2_a	0.341	0.081	0.083	0.079	0.079	0.084	0.085
r2_w		0.081	0.083	0.079	0.079	0.084	0.085
df_b		27	31	31	32	35	39

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

Note:

i) # PRF (the dependent variable $PRF_{c,z,t}$): Simple average of preferential tariffs applied by the US on partner *c* at six digit HS 1996 product *z* at time *t*.

ii) The dependent variable (PRF) is regressed on

(a) MFN: Simple average of MFN applied tariff by the US on product *z* at time *t* on six digit HS 1996 classification. MFN_i1 to MFN_i4 are year-wise quartiles of MFN tariffs. In case of regressions only with MFN, MFN_i1 denotes MFN variable. Similarly, in case of regressions with MFN_i1 and MFN_i2 variables, MFN_i1 denotes MFN tariffs below median and MFN_i2 denotes MFN tariffs above the median value in year *t*.

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

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

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

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

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

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

vii) *rho* values estimate that 33.6% to 37.6 % of variation in preferential tariff (i.e. dependent variable , PRF) is due to the product specific differences D_z .

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

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

Table 2

The Determinants of US's Preferential Tariff (all partners, product-wise)

	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)
	(1)	(2)	(3)	(4)
PRF#	FE	FE	FE	FE
MFN_af_i1	-0.058	-0.017	-0.041	-0.043
	(0.030)	(0.033)	(0.049)	(0.049)
MFN_af_i2	-0.043	-0.045	-0.072*	-0.071*
	(0.023)	(0.023)	(0.031)	(0.031)
MFN_af_i3	0.132***	0.131***	0.173***	0.173***
	(0.023)	(0.023)	(0.025)	(0.025)
MFN_af_i4	0.139***	0.139***	0.123***	0.123***
	(0.018)	(0.018)	(0.016)	(0.016)
MFN_na_i1	0.026**	0.079***	0.083***	0.083***
	(0.009)	(0.013)	(0.017)	(0.017)
MFN_na_i2	0.033**	0.030**	0.014	0.014
	(0.011)	(0.011)	(0.014)	(0.014)
MFN_na_i3	0.090***	0.088***	0.124***	0.124***
	(0.013)	(0.013)	(0.017)	(0.017)
MFN_na_i4	0.050	0.049	0.087	0.087
	(0.036)	(0.036)	(0.058)	(0.058)
Recp_ir1			0.450***	1.804***
			(0.021)	(0.072)
Recp_ir2			0.042***	0.350***
			(0.006)	(0.018)
Recp_ir3				0.062***
				(0.009)
Recp_ir4				0.597**
				(0.200)
GSP		-0.127***	-0.203***	-0.203***
		(0.021)	(0.025)	(0.025)
Constant	1.761***	1.769***	2.285***	2.641***
	(0.075)	(0.075)	(0.093)	(0.104)
N	345763	345763	295203	295203
N_g	5113	5113	5113	5113
F	70.836	70.462	70.565	69.319
rho	0.340	0.341	0.379	0.380
r2_a	0.080	0.080	0.084	0.085
r2_w	0.080	0.080	0.084	0.086
df_b	38	39	42	46

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

Note:

i) # *PRF* (the dependent variable $PRF_{c,z,t}$): Simple average of preferential tariffs applied by the US on partner *c* at six digit HS 1996 product *z* at time *t*.

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

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

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

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

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

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

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

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

vii) *rho* values estimate that 34% to 38 % of variation in preferential tariff (i.e. dependent variable , PRF) is due to the product specific differences D_z .

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

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

Table 3

The Determinants of US's Preferential Tariff (only DCs)

	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)
PRF#	(1) OLS	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE	(7) FE
MFN_i1	0.230***	0.114***	0.012	0.032**	0.091***	0.106***	0.105***
	(0.021)	(0.012)	(0.017)	(0.011)	(0.016)	(0.025)	(0.025)
MFN_i2			0.117***	0.020	0.017	-0.022	-0.022
			(0.013)	(0.013)	(0.013)	(0.019)	(0.019)
MFN_i3				0.119***	0.118***	0.173***	0.173***
				(0.016)	(0.016)	(0.021)	(0.021)
MFN_i4				0.140***	0.140***	0.108***	0.108***
				(0.014)	(0.014)	(0.012)	(0.012)
Recp_ir1	0.074***	0.073***	1.714***			1.713***	1.919***
	(0.007)	(0.007)	(0.071)			(0.071)	(0.079)
Recp_ir2			0.055***			0.055***	0.236***
			(0.006)			(0.006)	(0.062)
Recp_ir3							0.043***
							(0.007)
Recp_ir4							1.141*
							(0.470)
GSP	-0.283***	-0.340***	-0.242***		-0.135***	-0.285***	-0.284***
	(0.022)	(0.028)	(0.026)		(0.029)	(0.033)	(0.033)
Constant	0.740***	1.230***	0.034	0.800***	0.805***	-0.171*	1.555***
	(0.127)	(0.086)	(0.070)	(0.049)	(0.048)	(0.072)	(0.102)
N	216291	216291	216291	265201	265201	216291	216291
N_g		5110	5110	5113	5113	5110	5110
F	120.419	75.277	68.640	70.585	69.314	63.701	60.267
rho		0.442	0.445	0.348	0.348	0.437	0.437
r2_a	0.358	0.077	0.080	0.081	0.081	0.084	0.084
r2_w		0.077	0.080	0.081	0.081	0.084	0.084
df_b		25	29	29	30	33	37

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

Note:

i) # PRF (the dependent variable $PRF_{c,z,t}$): Simple average of preferential tariffs applied by the US on partner *c* at six digit HS 1996 product *z* at time *t*.

ii) The dependent variable (PRF) is regressed on

(d) MFN: Simple average of MFN applied tariff by the US on product *z* at time *t* on six digit HS 1996 classification. MFN_i1 to MFN_i4 are year-wise quartiles of MFN tariffs. In case of regressions only with MFN, MFN_i1 denotes MFN variable. Similarly, in case of regressions with MFN_i1 and MFN_i2 variables, MFN_i1 denotes MFN tariffs below median and MFN_i2 denotes MFN tariffs above the median value in year *t*.

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

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

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

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

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

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

vii) *rho* values estimate that 34.8% to 44.5 % of variation in preferential tariff (i.e. dependent variable, PRF) is due to the product specific differences D_z .

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

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

Table 4

The Determinants of US's Preferential Tariff (DCs, product-wise)

	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)
	(1)	(2)	(3)	(4)
PRF#	FE	FE	FE	FE
MFN_af_i1	-0.076*	-0.031	-0.041	-0.041
	(0.034)	(0.038)	(0.057)	(0.057)
MFN_af_i2	-0.034	-0.037	-0.105**	-0.105**
	(0.026)	(0.027)	(0.038)	(0.038)
MFN_af_i3	0.128***	0.126***	0.166***	0.166***
	(0.023)	(0.023)	(0.026)	(0.026)
MFN_af_i4	0.143***	0.143***	0.109***	0.109***
	(0.015)	(0.015)	(0.012)	(0.012)
MFN_na_i1	0.035**	0.095***	0.113***	0.113***
	(0.011)	(0.016)	(0.024)	(0.024)
MFN_na_i2	0.015	0.011	-0.021	-0.021
	(0.013)	(0.013)	(0.020)	(0.020)
MFN_na_i3	0.125***	0.122***	0.204***	0.204***
	(0.016)	(0.016)	(0.026)	(0.026)
MFN_na_i4	0.061	0.061	0.140	0.140
	(0.042)	(0.042)	(0.086)	(0.086)
Recp_ir1			1.713***	1.917***
			(0.071)	(0.079)
Recp_ir2			0.054***	0.193**
			(0.007)	(0.062)
Recp_ir3				0.043***
				(0.007)
Recp_ir4				1.144*
				(0.470)
GSP		-0.145***	-0.293***	-0.292***
		(0.028)	(0.032)	(0.032)
Constant	0.822***	0.832***	-0.210**	1.582***
	(0.050)	(0.050)	(0.079)	(0.103)
N	265201	265201	216291	216291
N_g	5113.000	5113.000	5110.000	5110.000
F	66.577	66.716	58.005	55.284
rho	0.356	0.358	0.464	0.464
r2_a	0.082	0.082	0.084	0.084
r2_w	0.082	0.082	0.084	0.084
df_b	36.000	37.000	40.000	44.000

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

Note:

i) # *PRF* (the dependent variable $PRF_{c,z,t}$): Simple average of preferential tariffs applied by the US on partner *c* at six digit HS 1996 product *z* at time *t*.

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

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

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

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

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

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

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

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

vii) *rho* values estimate that 35.6% to 46.4% of variation in preferential tariff (i.e. dependent variable , PRF) is due to the product specific differences D_z .

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

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

Structure of the Tariff Schedule

(Percent)

		1998	2000	2002	2004	2007
1.	Total number of tariff lines[a]	9,997	10,001	10,297	10,304	10,253
2.	Non-*ad valorem* tariffs (% of all tariff lines)	14.0	12.4	12.2	10.6	10.7
3.	Non-*ad valorem* with no AVEs (% of all tariff lines)	0.0	0.0	0.0	0.0	0.0
4.	Tariff quotas (% of all tariff lines)	2.0	2.0	1.9	1.9	1.9
5.	Duty-free tariff lines (% of all tariff lines)	18.6	31.5	31.2	37.7	36.5
6.	Dutiable lines tariff average rate (%)	7.2	8.0	7.4	7.8	7.6
7.	Domestic tariff "peaks" (% of all tariff lines)[b]	4.9	5.3	5.6	7.1	6.9
8.	International tariff "peaks" (% of all tariff lines)[c]	7.7	7.0	6.6	5.5	5.2
9.	Bound tariff lines (% of all tariff lines)[d]	100.0	100.0	100.0	100.0	100.0

a Chapters 1-97, at 8-digit level, excluding in-quota tariff lines.
b Domestic tariff peaks are defined as those exceeding three times the overall average applied rate.
c International tariff peaks are defined as those exceeding 15%.
d Two lines applying to crude petroleum are not bound.

Source: US Trade Policy Review, 2008. WTO Secretariat report.

Annex II

Summary analysis of the MFN tariff, 2007

Description	MFN			
	No. of lines	Average[a] (%)	Range (%)	Coefficient of variation (CV)
Total	**10,253**	**4.8**	**0 - 350**	**2.5**
HS 01-24	1,648	8.7	0 - 350	3.0
HS 25-97	8,605	4.1	0 - 67.3	1.4
By WTO category				
WTO Agriculture	**1,595**	**8.9**	**0 - 350**	**3.0**
- Animals and products thereof	139	4.2	0 - 100	2.4
- Dairy products	166	21.4	0 - 177.2	1.1
- Coffee and tea, cocoa, sugar etc.	315	9.7	0 - 90.7	1.4
- Cut flowers, Plants	57	1.7	0 - 6.8	1.2
- Fruit and vegetables	439	6.3	0 - 131.8	1.9
- Grains	21	1.6	0 - 11.2	1.6
- Oil seeds, fats and oils and their products	95	6.3	0 - 163.8	3.4
- Beverages and spirits	100	4.8	0 - 51.8	1.8
- Tobacco	47	56.0	0 - 350	2.2
- Other agricultural products n.e.s.	216	2.0	0 - 67.3	2.8
WTO Non-agriculture (incl. petroleum)	**8,658**	**4.0**	**0 - 63.9**	**1.4**
- WTO Non-agriculture (excl. petroleum)	8,630	4.1	0 - 63.9	1.4
- Fish and fishery products	201	2.0	0 - 35	2.2
- Mineral products, precious stones and precious metals	540	3.5	0 - 38	1.5
- Metals	1,015	1.9	0 - 23.8	1.4
- Chemicals and photographic supplies	1,843	3.7	0 - 6.5	0.7
- Leather, rubber, footwear and travel goods	397	7.3	0 - 63.9	1.6
- Wood, pulp, paper and furniture	526	0.7	0 - 14	2.8
- Textile and clothing	1,659	9.1	0 - 42.1	0.7
- Transport equipment	242	2.5	0 - 25	1.9
- Non-electric machinery	790	1.4	0 - 9.9	1.4
- Electric machinery	529	2.2	0 - 15	1.0
- Non-agriculture articles n.e.s.	888	3.0	0 - 35.8	1.2
- Petroleum	28	2.2	0 - 7	1.2

n.a. Not applicable

a Averages do not include HS lines and duty rates for in-quota tariffs.

Source: US Trade Policy Review, 2008. WTO Secretariat report.

Annex III

Tariffs according to U.S. Preferential Agreements, 2006

Description	Total	HS 01-24	HS 25-97	WTO Agriculture	Animals & products thereof	Dairy products	Fruit & vegetables	Oil seeds, fats & oils	Beverages & spirits	Tobacco	WTO Non-agriculture	Fish & fishery products	Textiles & clothing
No. of lines[a]	10,311	1,647	8,664	1,611	140	166	437	100	100	47	8,700	192	1,658
MFN	4.7	8.7	4	8.9	4.3	22.5	6.4	6	4.8	55.9	3.9	2	9
Canada[a]	0.6	3.4	0	3.5	0	17.5	0.9	3.1	0.3	0	0	0	0
Mexico[a]	0	0.1	0	0.1	0	0.5	0.1	0.3	0.2	0	0	0	0
Australia[a]	1.5	3.9	1.1	4.1	1.6	2.2	3.9	3.6	0.2	48.6	1.1	0	5
Bahrain	1	5.5	0.1	5.7	1.9	16	3	3.5	2.8	48.9	0.1	0.1	0
Chile[a]	1	5.3	0.2	5.5	0.8	18.1	3	2.9	2.8	40.8	0.2	0.3	0
DR CAFTA[a]	0.8	4.8	0	5	1.1	17.3	0.9	3.1	0.3	48.6	0	0	0
Israel[a]	0.3	1.9	0	2	1.1	5.8	0.3	0.1	0.3	0	0	0	0
Jordan[b]	0.7	3.1	0.3	3.2	0.5	6.9	0.6	1.2	1.2	55.3	0.3	0.1	1
Morocco[a]	1.8	5.9	1	6.1	1.8	17.4	3.1	3.8	3.4	51	1	0.1	4.6
Singapore[a]	1.3	4.7	0.7	4.7	1.2	12.8	3	2.8	2.5	38.2	0.7	0.8	0.1
AGOA[c]	2.2	5	1.7	5.2	1.1	17.5	1	3.1	0.5	52.1	1.6	0	8.6
ATPA[b]	2.4	5	1.8	5.2	1.1	17.5	0.9	3.1	0.8	52.1	1.8	0.3	8.4
ATPDEA[b]	2.2	5	1.7	5.2	1.1	17.5	0.9	3.1	0.8	52.1	1.6	0.3	8.2
CBI[b]	2.1	5	1.6	5.2	1.1	17.5	0.9	3.1	0.3	52.1	1.5	0.3	7.5
CBTPA[b]	3.1	7.4	2.3	7.6	3.5	22.3	4.2	5.1	4.3	55.3	2.3	0.8	8.7
GSP[a]	3.3	7.4	2.6	7.6	3.5	22.3	4.2	5.1	4.3	55.3	2.6	1	8.8
LDCs	2.5	5.2	2	5.4	1.1	17.5	1.3	3.1	2.1	52.1	2	0	8.8

a If a tariff lines is not eligible for this preferential programme, the rate used in the calculation of averages is the MFN rate.

b If a tariff line is not eligible for this preferential programme, the rate used in the calculation of averages is the GSP or MFN rate, whichever is the lowest rate generally applicable to that product.

c The calculations were made for LDC AGOA beneficiaries, as they constitute the majority of beneficiaries. If a tariff line is not eligible for this preferential programme, the rate used in the calculation of averages is the GSP or MFN rate, whichever is the lowest rate generally applicable to that product.

Source: US Trade Policy Review, 2008. WTO Secretariat report.

Annex IV

Availability of the US Preferential Tariff on WITS (TRAINS)

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Par	**Partner**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**	**Trains**
tner	**Name**	**H0**	**H1**	**H1**	**H1**	**H1**	**H1**	**H1**	**H2**	**H2**	**H2**	**H2**	**H2**	**H3**
0	World MFN Partners	5019	5113	5113	5113	5113	5113	5113	5224	5224	5224	5224	5224	5052
1	Australia (01 01 2005)											3250	3259	3183
2	Bahrain (01 08 2006)												2146	3201
3	Canada (01 01 1994)	4161	4214	4235	497	3600	3081		3612	3610	3275	3274	3275	3200
4	Chile (01 01 2004)										3276	3245	3267	3196
5	Costa Rica** (01 01 2009)													
6	Dominican Republic*** (01 01 2007)													3201
7	El Salvador (01 01 2006)												2723	3201
8	Guatemala (01 01 2006)												2728	3201
9	Honduras (01 01 2006)												2728	3201
10	Israel (01 01 1985)	4160	4212	4234		3600	1501		3612	3610	3275	3274	3275	3200
11	Jordan (17 12 2001)								3420	3419	3269	3252	3264	3190
12	Mexico (01 01 1994)	4163	4213	4227		3588	2604		3613	3610	3276	3259	3275	3200
13	Morocco (01 01 2006)												3261	3186
14	Nicaragua (01 04 2006)												2722	3201
15	Oman** (01 01 2009)													
16	Peru** (01 01 2009)													
17	Singapore (01 01 2004)										3276	3240	3264	3188

Notes :

1. **: The PTA is signed after 2007 and it does not fall within our study period (1995-2007), hence dropped from our analysis. (*Three* US partners)
2. ***: Although the PTA was signed in 2007, there is insufficient data for 2007. We drop this from our analysis, as the impact of this PTA will be visible only from 2008. (*One* US partner)

Annex V

The US's PTA Partners Tariff and Imports Data Availability on WITS

S. N.	PTA Partner	Date of PTA	Data Avail-ability	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1	Bahrain	01 08 2006	MFN					Trains	IDB	Trains/IDB	IDB	IDB	IDB	Trains	Trains	Trains
			PRF													Trains
			World Imp								CMT	CMT	CMT	CMT	CMT	CMT
			PRF Imp								CMT	CMT	CMT	CMT	CMT	CMT
2	Costa Rica** (DR-CA-US)	01 01 2009	MFN	Trains	IDB	IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	IDB	Trains/IDB	Trains/IDB	-	Trains
			PRF													
			World Imp													
			PRF Imp													
3	Domini-can Republic*** (DR-CA-US)	01 03 2007	MFN	-	IDB	Trains/IDB	IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains	Trains	Trains	Trains	-
			PRF													
			World Imp													
			PRF Imp													
4	Guatemala* (DR-CA-US)	01 07 2006	MFN	Trains	-	Trains	Trains/IDB	IDB	Trains/IDB	Trains/IDB	Trains	IDB	Trains	Trains	-	Trains
			PRF													
			World Imp	Trains	CMT	Trains	Trains	IDB	Trains	Trains	Trains	IDB	Trains	Trains	CMT	Trains
			PRF Imp												CMT	CMT
5	Hondu-rus* (DR-CA-US)	01 04 2006	MFN	Trains	=1997	IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	IDB	Trains	Trains/IDB	IDB	Trains/IDB
			PRF													
			World Imp	Trains	CMT	IDB	IDB	Trains	Trains	Trains	Trains	IDB	Trains	Trains	IDB	Trains
			PRF Imp												CMT	CMT
6	Nicara-gua* (DR-CA-US)	01 04 2006	MFN	Trains	IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB		Trains
			PRF													
			World Imp	Trains	IDB	IDB	Trains	Trains	Trains	Trains	Trains	IDB	Trains	Trains	CMT	Trains
			PRF Imp												CMT	CMT

S. N.	PTA Partner	Date of PTA	Data Avail-ability	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
7	El – Salvador* (DR-CA-US)	01 03 2006	MFN	Trains	IDB	Trains/IDB	Trains/IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains
			PRF												Trains	-
			World Imp	Trains	IDB	Trains	Trains	IDB	Trains	Trains	Trains	IDB	Trains	Trains	Trains	Trains
			PRF Imp												CMT	CMT
8	Canada (NAFTA)	01 01 1994	MFN	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			PRF	=1996	IDB	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			World Imp	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			PRF Imp	-	IDB	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
9	Mexico# (NAFTA)	01 01 1994	MFN	Trains	=1997	Trains	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains	Trains	IDB
			PRF	Trains	=1996	=1999	=1999	Trains	=2001	IDB	Trains	=2004	Trains	Trains	Trains	=2006
			World Imp	Trains	CMT	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	IDB
			PRF Imp	Trains	CMT	CMT	CMT	Trains	CMT	IDB	Trains	CMT	Trains	Trains	Trains	CMT
10	Australia	01 01 2005	MFN	-	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			PRF												Trains	Trains
			World Imp		Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			PRF Imp											CMT	CMT	CMT
11	Chile*	01 01 2004	MFN	Trains	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains
			PRF												Trains	Trains
			World Imp	Trains	IDB	Trains	Trains	Trains	Trains	Trains	Trains	IDB	Trains	Trains	Trains	Trains
			PRF Imp										CMT	CMT	CMT	CMT
12	Israel@	19 08 1985	MFN					IDB	IDB	IDB	IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains
			PRF										Trains	Trains	Trains	Trains
			World Imp					IDB	IDB	IDB	IDB	IDB	Trains	Trains	Trains	Trains
			PRF Imp										CMT	CMT	CMT	CMT

S. N.	PTA Partner	Date of PTA	Data Avail-ability	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
13	Jordon*	17 12 2001	MFN						Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB
			PRF											Trains		
			World Imp						Trains	Trains	Trains	Trains	IDB	Trains	Trains	Trains
			PRF Imp						CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
14	Morocco$	01 01 2006	MFN			Trains/IDB	-	-	Trains	Trains	Trains/IDB	Trains	-	Trains	Trains	Trains
			PRF												WTO	WTO
			World Imp								CMT	CMT	CMT	CMT	CMT	CMT
			PRF Imp								CMT	CMT	CMT	CMT	CMT	CMT
15	Oman**	01 01 2009	MFN	-	-	Trains	-	-	-	IDB	Trains	-	-	Trains	Trains	Trains
			PRF													
			World Imp													
			PRF Imp													
16	Peru**	01 02 2009	MFN	Trains	-	Trains	Trains/IDB	Trains/IDB	Trains/IDB	IDB	IDB	IDB	Trains/IDB	Trains/IDB	Trains/IDB	Trains/IDB
			PRF													
			World Imp													
			PRF Imp													
17	Singa-pore*	01 01 2004	MFN	Trains	IDB	IDB	IDB	IDB	IDB	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			PRF											Trains		Trains
			World Imp	Trains	IDB	IDB	IDB	IDB	IDB	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			PRF Imp										CMT	CMT	CMT	CMT

Notes :

1. *: We get preferential tariff by codifying the legal text of the US and partner Agreement. (*Seven* US partners), Source: WTO Regional Trade Agreements Information System (RTA-IS) http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx (*Seven* US partners).
2. **: The PTA is signed after 2007 and it does not fall within our study period (1995-2007), hence dropped from our analysis. (*Three* US partners)
3. ***: Although the PTA was signed in 2007, there is insufficient data for 2007. We drop this from our analysis, as the impact of this PTA will be visible only from 2008. (*One* US partner)
4. The complete data on MFN and preferential tariff is available only for *three* partners namely Bahrain, Canada, and Australia. For Mexico, Israel and Morocco substantial data is available. (*Six* US partners)

5. #: wherever the tariff data is not available, we substitute the missing year's tariff with the nearest available year's tariff.
6. @: MFN tariff is available for the years 1999 to 2007 and the preferential tariff is available for the years 2004 to 2007. Interestingly, the legal document of the PTA is not available, only the highlights of the agreement are available. One highlight is complete elimination of tariffs on all the products by 01.01.1995. We use this information to construct preferential tariff data for the years 1999 to 2003.
7. $: we get preferential tariff from the WTO's Regional Trade database directly . http://rtais.wto.org/UI/PublicShowMemberRTAIDCard.aspx?enc=Q6mlxSufgPIwin1qUYY1HY5jXkJ6LqSsfoOPqS+O+Jk=

Annex VI

Data description

Variable	Model	Data/description	Source	Remarks
$PRF_{c,z,t}$	Equation (5) to (7)	*Simple average* of ad-valorem preferential tariffs applied by the US on import of six digit HS 1996 product *z* from the partner *c* at time *t*.	Trains	Refer **Annex IV** for details on US's preferential tariff data availability.
$MFN_{z,t}$	Equation (5) to (7)	*Simple average* of MFN applied tariff by the US on imports of six digit HS 1996 product *z* from rest of the world at time *t*.	Trains	
$M^{c}_{us,z,t}$		Imports of product *z* from the US by partner *c* at time *t*	Trains / Com -trade	Refer **Annex V** for available data on preferential imports.
$M^{c}_{total,z,t}$		Total imports of product *z* by partner *c* at time *t*.	Trains / Com -trade	Refer **Annex V** for available data on total imports.
$s^{c}_{us,z,t}$		Ratio of $M^{c}_{us,z,t}$ and $M^{c}_{total,z,t}$.		$= M^{c}_{us,z,t} / M^{c}_{total,z,t}$
$MFN^{c}_{z,t}$		MFN tariff applied by partner *c* on HS 1996 product *z* at time *t*.	Trains / IDB	Refer **Annex V** for data availability on MFN tariff.
$PRF^{c}_{us,z,t}$		Preferential tariff applied by partner *c* on US HS 1996 product *z* at time *t*.	Trains / IDB	Refer **Annex V** for details on partners' preferential tariff data availability.
$mop^{c}_{us,z,t}$		Margin of preference or *mop*		$= MFN^{c}_{z,t} - PRF^{c}_{us,z,t}$
$-mop^{c}_{us,i,t} * s^{c}_{us,i,t}$		Reciprocity offered by partner *c* to the US on product *i* at time *t*.		
N^{c}_{t}		The number of products on which the partner *c* extends preferential access to the US at time *t*.	Trains / IDB	
$Recp_{c,z,t}$	Equation (5) to (7)	The sum of reciprocal preferences extended by partner *c* on all products except *z* at time *t*.		$\frac{1}{(N^{c}_{t}-1)} \sum_{\substack{i=1 \\ i \neq z}}^{i=N^{c}_{t}} (-mop^{c}_{us,i,t} * s^{c}_{us,i,t})$
$GSP_{z,t}$	Equation (5) to (7)	A dummy variable that is equal to one if the product *z* gets GSP benefit in US market at time *t* otherwise it is equal to zero.	Trains	
$i1_{z,t}$	Equation (6), (7)	An indicator variable that is equal to one, if *MFN* tariff falls in the *first* quarter of MFN tariff applied by the US on all products at time *t*, otherwise it is equal to zero.		For equation (6), we have one cut-off point. Hence, $i1_{z,t}$ is equal to one, if $MFN_{z,t}$ is *smaller* than the cut-off value of *5.3%*, otherwise it is equal to zero.
$i2_{z,t}$	Equation (6), (7)	An indicator variable that is equal to one, if *MFN* tariff falls in the *second* quarter of MFN tariff applied by the US on all products at time *t*, otherwise it is equal to zero.		For equation (6), we have one cut-off point. Hence, $i2_{z,t}$ is equal to one if $MFN_{z,t}$ is *greater* than the cut-off value of *5.3%,* otherwise it is equal to zero.

Variable	Model	Data/description	Source	Remarks
$i3_{z,t}$	Equation (7)	An indicator variable that is equal to one, if *MFN* tariff falls in the *third* quarter of MFN tariff applied by the US on all products at time *t*, otherwise it is equal to zero.		
$i4_{z,t}$	Equation (7)	An indicator variable that is equal to one, if *MFN* tariff falls in the *fourth* quarter of MFN tariff applied by the US on all products at time *t*, otherwise it is equal to zero.		
$ir1_{c,z,t}$	Equation (6), (7)	An indicator variable that is equal to one, if reciprocity by partner *c* on product *z* at time *t* is in the *first* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.		For equation (6), we have one cut-off point. Hence, $ir1_{c,z,t}$ is equal to one, if $Recp_{c,z,t}$ is *lower* than the cut-off 3.776, otherwise it is equal to zero.
$ir2_{c,z,t}$	Equation (6), (7)	An indicator variable that is equal to one, if reciprocity by partner *c* on product *z* at time *t* is in the *second* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.		For equation (6), we have one cut-off point. Hence, $ir2_{c,z,t}$ is equal to one, is $Recp_{c,z,t}$ is *higher* than the cut-off value of *3.776*, otherwise it is equal to zero.
$ir3_{c,z,t}$	Equation (7)	An indicator variable that is equal to one, if reciprocity by partner *c* on product *z* at time *t* is in the *third* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.		
$ir4_{c,z,t}$	Equation (7)	An indicator variable that is equal to one, if reciprocity by partner *c* on product *z* at time *t* is in the *fourth* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.		

Notes:

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

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

Comtrade: The United Nation Statistical Division (UNSD) **Commodity Trade** (COMTRADE) Data Base that contains Exports and Imports by Commodity and Partner Country. Values are recorded in US Dollars along with a variety of quantity measures. The Data Base includes information for over 130 countries, some of which have been reporting these types of statistics to the United Nations since 1962.The data are recorded according to six internationally recognized trade and tariff classifications.

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

Annex VII

Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
year	351510	2002.988	3.762	1995	2007
hs1	351510	549186.5	272444.2	10111	970600
$PRF_{z,t}$	350402	0.355	2.627	0	175
$MFN_{z,t}$	346274	3.937	6.838	0	350
MFN_i1	346274	0.276	0.646	0	2.5
MFN_i2	346274	0.896	1.641	0	5.29
MFN_i3	346274	1.698	3.546	0	14.19
MFN_i4	346274	1.067	6.456	0	350
MFN_i1_m	346274	1.172	1.617	0	5.29
MFN_i2_m	346274	2.765	7.116	0	350
$Recp_{z,t}$	298266	-2.560	2.841	-9.372	0
Recp_i1	298266	-0.226	0.314	-1.024	0
Recp_i2	298266	-0.607	1.133	-3.776	0
Recp_i3	298266	-1.255	2.619	-9.013	0
Recp_i4	298266	-0.472	2.041	-9.372	0
Recp_i1_m	298266	-0.833	1.053	-3.776	0
Recp_i2_m	298266	-1.727	3.137	-9.372	0
$GSP_{z,t}$	351510	0.512	0.500	0	1