Three Essays on the Generalized System of (Trade) Preferences

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ABSTRACT

The Generalized System of Preferences (GSP) is a unilateral trade liberalization program in which developed countries offer non-reciprocal tariff reductions (tariff preferences) on certain products imported from designated developing and least developed countries. GSP is considered an important tool in the World Trade Organization's approach to development. This dissertation–composed of three essays–explores whether low-income countries have achieved an increased access to high-income markets as a result of these non-reciprocal tariff preferences offered to their exports. The first essay provides an overview of the GSP program. The second essay presents an evaluation of the GSP program by considering the products and markets where low-income countries' exports are concentrated. Using a theoretically consistent gravity equation for primary and processed agri-food trade over the period 1962-2010, the results illustrate that the GSP program and modifications of it have delivered significant positive effects in developing countries' exports to developed country markets in agricultural trade but not necessarily so in non-agricultural goods. The third essay develops two theoretically founded novel indices to measure preference margins offered by high-income countries to low-income countries through tariff reduction. One index captures the restrictions bilateral tariff rates impose on market access conditions of a country as compared to the most favored nation rate, called the Exponential Trade Restrictiveness Index (ETRI). The other index captures the relative ease with which a country can access foreign markets compared to its competing suppliers, called the Exponential Relative Preferential Margin (ERPM). Then, these two bilateral indices are used to develop a model of sector-based bilateral trade to re-evaluate the Generalized System of Preferences (GSP) in terms of relative market access preferences. The results show that the GSP has increased relative market accessibility for low-income countries and in turn boosted exports from these countries by 26 to 28 percent.

Dedication

To my parents, Maya Devi Sharma and Kashi Ram Upadhayay, for their endless love, support and encouragement.

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Chapter 1

Introduction

1.1 Background

The global economic downturn in the post-war period of 1960's created a huge trade gap between high-income and low-income countries (Santos, Farias and Cunha 2005). To foster an environment that enabled a more integrated global trading system, policy-makers sought special and differential market access for less developed countries. As originally conceptualized by Argentine Economist Raul Prebisch,[1] primary instrument for this change would be 'tariff preferences' on developing countries' exports. Developing countries discussed the preferences using United Nations Conference on Trade and Development (UNCTAD) as a primary forum for negotiations. However, it was soon evident that such a preferential program was not compatible with the Most Favored Nation (MFN)[2] founding principle of the General Agreement on Tariffs and Trade (GATT). In 1971, GATT followed the lead of UNCTAD and introduced a waiver to the MFN clause for a period of ten years. The Generalized System of Preferences (GSP) was then created that allowed non-reciprocal tariff preferences on certain products imported from designated beneficiary countries, while simultaneously preserving the principle of MFN. The idea of non-reciprocity of preferences means that when a country offers GSP tariff reduction, it does not ask for a preferential treatment from the beneficiary in exchange. While GSP is

[1]He had been the Secretary-General of the United Nations Economic Commission for Latin America and would be the first General Secretary of the UNCTAD in its inception.

[2]Most favored Nation principle came into practice with WTO and it does not allow discriminatory practices such as favoring products from one country compared to similar goods from another.

generally understood as an unilateral program–developed countries offering the GSP have latitude to decide which countries and products qualify for such preferences– the term "unilateral" is not specifically included in the Resolution 21 (II) of the UNCTAD II conference in New Delhi which formalized the concept.[3]

Although internalized in GATT, the legal mechanism enabling GSP was initially weak since the 1971 exemption of MFN clause was a temporary waiver. The Tokyo Round negotiations in 1979 established an enabling clause - a legal framework that exempted MFN obligations for GSP on a permanent basis. This enabling clause is with a caveat that the system has to be "generalized, non-discriminatory and non-reciprocal" in that a country is not supposed to provide preference benefits to few of their allies through the system or to expect any preferences in exchange. That said, each GSP offering country has established a mechanism to protect infant industries in its home country from import competition, and this mechanism does not necessarily match across different donor countries. Currently, 43 industrialized countries provide GSP treatment to more than 200 states and territories.[4] Table 1.1 provides the list of the GSP programs along with their start date. These programs differ in countries selected for preferential benefits, their product coverage, and the terms of market access they provide to their respective beneficiaries. While these aspects vary, all GSP programs share a common goal of providing improved market access to products originating in less developed countries.

The GSP as originally conceived had three objectives pertaining to the beneficiary countries: (1) to increase their export earnings; (2) to promote their industrialization; and (3) to accelerate their rates of economic growth.[5] To ensure that the GSP benefits are accrued to the intended recipients, it enforces *'rules of origin'* which requires that an eligible product has to originate or has to undergo a minimum amount of value added processing in a recipient less developed country. This rule discourages rent seeking behavior, that could otherwise encourage the transshipment of products through a GSP beneficiary country. The *'rules of origin'* includes the origin criteria, consignment conditions and documentary evidence requirements. The origin crite-

[3]See for e.g., *United Nations. 1968. Proceedings of the United Nations Conference on Trade and Development, second session, New Delhi, p 38. [1 Feb-29 March 1968]*

[4]See World Trade Organization. 2016. Preferential trade arrangements: list of PTAs. Accessed at: `http://ptadb.wto.org/ptaList.aspx`

[5]See UNCTAD. 2016. About GSP. Accessed at `http://unctad.org/en/Pages/DITC/GSP/About-GSP.aspx`

ria is generally defined in terms of the good being wholly obtained (produced and manufactured) or sufficiently processed or transformed into another product in the preference-receiving country. The consignment condition relates to the modalities of transport from a beneficiary to the GSP offering country. The documentary evidence requirement refers to the evidence requirements needed to verify the origin of a product.[6] For the recipient countries, complying with this *'rules of origin'* involves cost. Herin (1986) found that the compliance cost was equivalent to a tariff rate of three to five percent. Subsequent studies also provide similar conclusions regarding the tariff equivalence of the compliance cost (see for e.g., Carrére and Melo 2004, François, Hoekman and Manchin 2006). While the GSP utilization is not without cost, Inama (2003) reports the utilization rate[7] for the preferences offered by Canada, the European Union, Japan, and the United States to be 61, 31, 46 and 67 percent respectively. More recently, these countries have reformed their GSP programs with an ambition to ease the administrative processes and meet the developing country needs which are discussed further below.

The remainder of this chapter is organized as follows. Section 1.2 summarizes the European Union's GSP program and Section 1.3 briefly describes the US GSP program. Section 1.4 introduces the other GSP programs and their key features. Section 1.5 discusses the effectiveness of the GSP program with emphasis on US and EU GSP programs. Section 1.6 and 1.7 respectively describe the goals and organization of this dissertation.

1.2 The European Union's GSP Program

The European Community introduced a GSP program in 1971 providing improved market access to 178 developing countries. Since its initial implementation, the EU has periodically reformed and enhanced its GSP program. The EU GSP program has three key features, namely tariff modulation, graduation of beneficiaries, and spe-

[6]GSP offering countries use 'Form A' as the main documentary evidence for identifying the origin. The United States does not require GSP 'form A', exporters seeks GSP treatment by placing the prefix 'A' before the Harmonized Tariff Schedule of the product being exported. Additional certifying documentation is required only for textiles and handicrafts.

[7]Utilization rate is defined as the ratio of exports actually receiving the preferences to the exports eligible for the preferences

cial incentive arrangement (UNCTAD 2008). Tariff modulation refers to revisions on quantitative limitations on GSP imports that existed prior to 1994. Under this reform, the traditional approach of offering duty-free treatment for limited quantities of imports was replaced with more general tariff reductions based on sensitivity of products. This revision classified the GSP eligible products into four categories as non-sensitive, semi-sensitive, sensitive, and very sensitive. The sensitivity of products is determined based on the circumstance of the sector producing the same product in the EU. The revision offered a preferential margin–the difference between the MFN tariff rate[8] and lower duty rate offered through the GSP–of 15 percent on very sensitive products, a 30 percent preferential margin for sensitive products, a 65 percent preferential margin for semi-sensitive products and a duty free treatment for non-sensitive products (European Commission 2004).These categories were simplified into grouping products into either sensitive or non-sensitive product categories in 2002 program revision.

Graduation refers to the exclusion of certain beneficiaries from exporting products from specific sectors under the GSP program, or from participating in the entire GSP scheme. Graduation of a country or a country's products is determined by one of a following two criteria: the degree of a country's export specialization, or its economic development performance. The latter is based on World Bank's classification of a beneficiary as a "high-income" country. This policy was first introduced in 1995 and has gone through two subsequent revisions. The first revision was in 2006 and simplified the graduation rule; if a GSP beneficiary country's imports of a product exceeded 15% (12.5% for textiles) of all EU imports of that product, that country would be designated as having "graduated" the GSP program for the concerned product. In 2012, the most recent round of the EU GSP revisions, increased this graduation threshold to 17.5% (14.5% for textile products; European Commission 2015). The third feature is the special incentive arrangement, which is designed to promote sustainable development and governance through offering deeper preferential margins. Consistent with this reform, EU formed a separate GSP scheme called the GSP+ program in 2006. The discussion on GSP+ program is postponed for a while.

The current cycle of the EU GSP program began in 2014 and will continue for a

[8]MFN tariff rate is the tariff rate negotiated through the multilateral processes of the WTO.

period of ten[9] years until 2023.[10] The EU now offers three main variants of the GSP program. First, there exists a standard GSP program that offers partial or entire tariff removal on all product categories notwithstanding the country-sector graduation rule. Second, the "GSP+" program, offers duty free treatment on essentially the same products covered in standard GSP programs. The GSP+ program is available to countries that comply with various international agreements on environmental protection, good governance, child labor and other human rights issues, and for countries that combat drug production. The third program variant is the "Everything But Arms" (EBA) arrangement which is available to 49 least developed countries (LDCs), and which offers duty and quota free market access to all products, except for arms and ammunitions. The EBA scheme was introduced in 2001.

In the previous scheme that was effective until 2014, the standard EU GSP covered about 7,000 products, of which 3,250 were considered non-sensitive and 3,750 were considered sensitive products. The latest EU GSP revision (in 2012)[11] adds 15 new tariff lines to the non-sensitive category, four products previously classified as 'sensitive' have been moved to non-sensitive category, and four new tariff lines have been added to the GSP+ program. All these newly added tariff lines qualify for duty-free treatment (European Commission 2015a). As a rule, the standard GSP program offers a flat tariff reduction of 3.5 percent below the MFN rate; however, in practice, most of the non-sensitive items face a zero tariff rate in the EU market. Under the GSP+ program, products qualify for additional five percent tariff reduction thus increasing the total tariff reduction to 8.5 percent below the MFN rate. An exception to this rate applies on clothing and textiles, which actually qualify for 20 (40) percent tariff reduction in the standard GSP (GSP+) program. In addition, under a special arrangement to combat drug production, the GSP+ program offers duty free treatment on agricultural products which otherwise are either classified as sensitive products or are not covered at all in the standard GSP program. This GSP+ provision is available to 12 Andean and Central American countries and Pakistan. As an example of its importance for a recipient country, a major daily English-language newspaper in Pakistan–*The Express Tribune* noted that after being eligible for the EU's GSP+ preferences, Pakistan is expected to increase its annual sales to Europe

[9] In the past the EU GSP program required renewed every three years

[10] For a brief description on the EU GSP program, see European Commission website. 2015. EU trade and Generalized Scheme of Preferences. Accessed at `http://ec.europa.eu/trade/policy/countries-and-regions/development/generalised-scheme-of-preferences/`

[11] Although revised in 2012, the program application was deferred until 2014.

from $ 500 million to one billion USD.[12] The EBA initiative covers almost all the dutiable products, roughly 8,200 tariff lines, which are allowed duty free access to EU market. Initially, exceptions for duty and quota free treatment were maintained on fresh bananas, rice, and sugar. Duties on these products, however, were also eventually removed; duty free access was granted for bananas in January 2006, for sugar in July 2009, and for rice in September 2009.

Taken together, the EU offers the most extensive GSP scheme in terms of coverage. Until 2013, the EU provided lower tariffs or completely duty-free access for imports from 176 less developed countries and territories into the EU market. In 2013, about €93 billion of imports received GSP preferences. More than €74 billion of these imports were from countries under the standard GSP scheme, approximately €4.5 billion of imports from GSP+ beneficiaries, and more than €14 billion of imports through the EBA program(European Commission 2015b). The 2012 program revision, however, reduced the number of beneficiary countries to the 89 "most in need" nations. Before the reform, the EU carried out a public consultation with stakeholders, including industries, beneficiary countries, WTO members and the European Parliament.[13] The consultation underscored the importance of the program for developing countries' trade expansion but stressed the need for modifications to focus the program towards countries in greatest need. As a result, three groups of countries were removed from the EU GSP program eligibility. The first group includes 33 overseas countries and territories- mainly EU territories but also includes US, Australian and New Zealand territories which did not utilize the preferences. The second group includes 26 countries that also have other EU preferential arrangements which provided "substantially equivalent" coverage as compared to the GSP programs. The third category includes high and upper-middle income countries and were deemed not to need the preferential treatment for their exports to EU. As the European Commission notes, this revision 'concentrates' preferences on countries in need, and thus enhances stability and predictability of the program.

[12]see Zaheer, F. Capitalizing on: GSP Plus –for three or ten years. The Express Tribune-Business. February 2, 2014. Accessed at: `http://tribune.com.pk/story/666680/capitalising-on-gsp-plus-for-three-or-ten-years/`

[13] see for e.g., European Commission. 2012. Trade as a driver of development: accompanying the document–communication from the commission to the European parliament, the council and the European economic and social committee. Commission staff working document. Brussels.

1.3 The United States' GSP Program

Initially hesitant about the preferential trade agreements, the United States introduced GSP – the first and the largest of its trade preference programs – in 1976, eight years after the UNCTAD originally recommended establishment of the GSP programs (see, for example, Office of the United States Trade Representative 2015a, Santos, Fariah and Cunha 2005). Currently, the US eliminates custom duties on up to 5,000 products imported from the 122 designated GSP countries and territories(Office of the United States Trade Representative 2015b). To be eligible for this preferential treatment, GSP rule of origin requires that the GSP beneficiary country exporting the item must have added at least 35% of the appraised value of the product (Jones 2015). As in the EU GSP program, the US GSP program also graduates countries that are deemed "high income" by the World Bank. For example, following their classification into high-income category, Equatorial Guinea, and Trinidad and Tobago were graduated from the US GSP program in 2010 (The Trade Partnership 2011). Additionally, the President of the United States can also graduate country should he deem the beneficiary country "sufficiently competitive or developed". This was the case when President Obama removed Russia from the list of beneficiary countries effective October 2014 (Office of the Federal Register 2015).

Country eligibility for the US GSP program has also evolved over time. The US GSP program initially excluded Communist countries (except for the former Yugoslavia) and Organization of the Petroleum Exporting Countries' (OPEC) members; but both of those restrictions were later removed(UNCTAD 2010). Most states of the former Soviet Union were made eligible for the GSP preferences in between 1993-1995. Three OPEC members -Ecuador, Indonesia and Venezuela were designated for the US GSP program in 1980.[14] As for product specific graduation, the US GSP program has established 'Competitive Need Limits' (CNLs) criteria for the President to withheld preference treatment for a given beneficiary if needed. CNLs take effect (with Presidential action) if the value of an imported product either reaches a certain threshold dollar value, for example of $165 million in 2014, or if the import of a product from a beneficiary exceeds 50% of the current total US imports. CNL does not apply to the least developed countries.

[14]Ecuador joined OPEC in 1973, left in 1992 and rejoined in 2007; Indonesia was a OPEC member during 1986-2008; and Venezuela is a founding member of OPEC (Blanchard and Hakobyan 2013)

The US GSP program has two main schemes: one offered to developing countries, and the other offered to the least developed countries (LDCs). The sub-Saharan African countries, and Central American and Caribbean countries also receive GSP benefits akin to the least developed country participants through the African Growth and Opportunity Act (AGOA), and the Caribbean Basin Economic Recovery Act respectively. The standard US GSP program covers 3,509 product lines at the eight-digit product level of the harmonized tariff schedule, while the least developed beneficiary countries qualify for preferential tariff treatment for products imported under an additional 1,472 product lines. Most countries which offer GSP programs establish different levels of tariff reduction for different products. By comparision, the US approach to establishing a GSP tariff schedule is greatly simplified -it offers duty free treatment of all the eligible product imports from all beneficiary countries. Five to ten percent of annual US imports under the GSP program are in the agri-food sector (Jones 2015). The total imports under the program have almost doubled since 1989 when the US International Trade Commission (ITC) first began separately tracking imports under this program (Olson 2014). As the study notes, most of the import increase occurred in the period between 1989 and 1993.

The US GSP program, like the EU GSP program, receives domestic support. The *Washington Monthly* notes that a coalition of 450 import companies sent a letter to the House and Senate in favor of US GSP program renewal in 2013. Despite this support, each contract renewal period is characterized by debate in the U.S. Congress. However, the coalition makes a case that following its reinstatement in 2015, GSP saved American companies a total of $230 million in four months from August to November of the same year (Coalition for GSP 2016). As an example of importance of this program to recipient countries, the Democratic Republic of Congo, Cambodia, Nepal and Samoa made an export worth of $ 93.7 million, $ 34.9 million, $4.6 million and $1.0 million respectively through the GSP preferences to the United States in the year 2012.[15]

Those who oppose the program favor reciprocal approaches to trade and argue that non-reciprocal preferences including GSP hurt U.S. producers and U.S. jobs. Critics of the US GSP program also cite a mismatch between the imported goods and product eligibility criteria as a major setback in GSP utilization in some sectors. For example, items such as textiles and apparels, vehicles, watches, footwear, handbags, luggage, flat goods, work gloves and other leather wearing are among the top 20

[15]2012 is the most recent full year of the US GSP implementation

imported items but are subject to reduced GSP eligibility and high tariff (UNCTAD 2010, p. 12). In case of vehicles for instance, developing countries are eligible for GSP preferences on only about 45% of the product lines. In case of apparel, GSP is offered on a limited range of items such as gloves and mittens, silk items, and headbands. In terms of dollar value, this lack of GSP program eligibility resulted in exporters paying an additional $4 billion in duties in 2012 (Olson, 2014). The agricultural sector also excluded notable products including tobacco, rice and cotton imports. In cases when these goods are eligible for GSP benefits, the preferences are withdrawn when the WTO tariff rate quota is filled. Nevertheless, GSP programs are subject to annual reviews and have a provision where an interested country can petition for modifications in the list of products or countries eligible for GSP treatment. These requests are reviewed in collaboration with the United States International Trade Commission (USITC). Estimates by the Congressional Budget Office project the cost of the US GSP program to be about $1 billion in 2015. This value, however, is inflated as it includes a retroactive refund of duties collected during a lapse in the GSP program between 2013-2015. Estimates for 2016 and 2017 are projected to be $ 627 million, and $ 665 million in foregone tariff revenues respectively (CBO 2015).

1.4 Other GSP Programs

Other GSP programs are offered by Australia,[16] Bulgaria, Chile, China, Chinese Taipei, Canada, Iceland, India, Japan, Kyrgyz Republic, Morocco, New Zealand, Norway, Republic of Korea,[17] the Russian Federation, Switzerland,[18] Turkey and Thailand.[19] Most of the GSP providers admit all eligible products duty-free, but some countries only provide partial tariff reduction. For example, Australia's GSP program provides recipients a five-percent margin of preference; when the general Australian tariff rate is five percent or less, the Australian GSP program offers duty

[16]United Nations Conference on Trade and Development. 2000. GSP-handbook on the scheme of Australia. Accessed at: `http://unctad.org/en/Docs/itcdtsbmisc56_en.pdf`

[17]United Nations Conference on Trade and Development. 2013. Handbook on the preferential tariff scheme of the Republic of Korea in favour of least developed countries 2013. Accessed at: `http://unctad.org/en/PublicationsLibrary/itcdtsbmisc75_en.pdf`

[18]United Nations Conference on Trade and Development. 2014. Generalized System of Preferences: handbook on the scheme of Switzerland 2014. Accessed at: `http://unctad.org/en/PublicationsLibrary/itcdtsbm28rev3_en.pdf`

[19]World Trade Organization. 2016. Preferential trade arrangements: list of PTAs. Accessed at `http://ptadb.wto.org/ptaList.aspx`

free access to its market. In terms of product and country coverage, the Australia's GSP scheme includes all products and is restricted to LDCs and specified south pacific island territories. In case of Switzerland, it started providing duty free and quota free treatment to all industrial products, and exempted custom duties on most of the agricultural products for LDCs in 1997. In 2007, Switzerland extended duty-free and quota-free treatment to all industrial products except textiles and clothing to developing countries as well.

Similarly, Canada[20] also provides tariff reduction on imports of agricultural and industrial products except for certain textiles and apparel, footwear, and chemical products from developing countries. Further, with the exception of dairy, poultry and egg products, Canada also offers tariff free market access to LDCs. Beginning in January 2015, Canada's GSP benefits were withdrawn from 72 countries; currently, 103 countries are recipients of Canada's GSP program (Canada Gazzete 2015). Japan provides GSP tariff reductions to 337 agricultural and fishery products, and 3,141 industrial products from developing countries. For LDCs, Japan allows duty free treatment for most products that are not among a long list of products classified as sensitive. Sensitive products is eligible for some tariff reductions (sensitive products detailed in Annex 3; UNCTAD 2011).

As mentioned earlier, each GSP providing nation also has safeguards in place to ensure that any significant increases in imports of a given product do not adversely affect the home country's domestic market. Generally, these restrictions take the form of quantitative limits on goods entering under GSP. In case of Japan, for example, imports of certain products under the preference are limited by quantity or value (whichever is applicable) on a first-come, first-served, basis as administered on a monthly (or even daily) basis. Further, each preference-granting country has rules of origin to distinguish between its beneficiary countries and non-recipient countries. While under the WTO, developing country status of members is generally based on self-identification (WTO 2015); in regard to the GSP program however, each GSP donor country establishes its own conditions for defining recipient countries. As a result, the list of GSP beneficiaries varies between countries. Figure 1.1 shows the number of GSP offering and recipient countries for a time period between 1975 and

[20]United Nations Conference on Trade and Development. 2013. Generalized System of Preferences: handbook on the scheme of Canada 2013. Accessed at: `http://unctad.org/en/PublicationsLibrary/itcdtsbmisc66rev1_en.pdf`

2010.[21] We see a greater increase in the number of recipients during 1990-2001 which might be reflective of the new LDC-specific schemes enacted following the WTO's Uruguay Round of negotiations as summarized in Table 1.[22]

1.5 The Effectiveness of the GSP Program

A survey of the literature examining GSP programs shows that research attention has been focused mainly in three areas: the estimation of trade effects of GSP programs; on institutional arrangements and associated limitations; and on examining preference margins. Each of these literature streams is introduced below.

At the start of the GSP program, a first wave of studies predicted a positive effect of GSP programs on trade. For example, Clague (1971) showed that tariff preferences of 50 percent in finished manufactured products would increase the exports from least developed countries by about 22 percent. The expansion of exports of semi-manufacture goods would, however, be sensitive to their supply elasticity. Iqbal (1976) found that without quantitative restrictions GSP tariff preferences would expand the exports from LDCs to developed countries by about 31 percent. Quantitative restrictions, however, would decrease this increase in exports from less developed countries by 3 to 83 percent. Baldwin and Murray (1977) claimed that GSP tariff reduction, as opposed to MFN rates, would increase the exports of all industrial goods by 27 percent. Further, they predicted that without any quantitative restrictions such as competitive need limits or tariff quotas, GSP preference would expand the exports from low-income countries by 50 percent. These studies are limited in the sense that these are static analysis and thus the results might not fully hold in the face of dynamic preferences.

Another series of studies estimated GSP effect on exports using trade flows observed

[21] This information is compiled from Handbooks on the GSP schemes accessed at: `http://unctad.org/en/Pages/DITC/GSP/Handbooks-on-the-GSP-schemes.aspx` and GSP Newsletters accessed at: `http://unctad.org/en/Pages/DITC/GSP/GSP-Newsletters.aspx`, and from the list of preferential trade arrangements obtained from WTO's PTA database accessed at: `http://ptadb.wto.org/ptaList.aspx`

[22] These numbers are based on countries (185) included in this dissertation research which is explained in more detail in Chapter 2.

after the implementation of the program. Mixed results were found in the results of these studies. In analyzing the US GSP program, Sapir and Lundberg (1984), compared US imports before and after the implementation of the program and reported a positive GSP effect on imports from beneficiaries; however an economically significant program effect was observed in cases when the beneficiaries were already major suppliers before the start of the GSP program. Lederman and Özden (2007) evaluated US preferential trade programs, including GSP programs, by running cross-section gravity equation analysis for 1997 and 2001. While these authors found a large, positive, trade effect in case of free trade agreements, a negative GSP effect was reported in several of their specifications. While this study compares two periods of time, similarly ambiguous results can be found in later studies using panel data. For example, Nilsson (2002) analyzed the European GSP scheme and the Lome regime for the African Caribbean and Pacific Countries (ACP) using trade data for the period 1973-2002 and report GSP effect of each EU importer by year. Using gravity model, Nilsson finds both positive and negative GSP coefficients for several EU importers. Further, the positive coefficients tend to occur in the beginning and at the end of the sample period.

Initially, the purpose of GSP programs was to offer preferences on industrial goods to improve the terms of trade of developing countries with developed countries.[23] As such, it is not surprising that most of the above research focus either on trade of industrial products or analyze the GSP program effect using highly aggregated trade data. However, the Uruguay round identified a subset of countries among low-income nations - least developed countries. Subsequent to this recognition, this group of countries frequently received more generous tariff preferences and expanded product eligibility, including agricultural products, than was previously extended. Thus, it is important to take into account sector or product level differences in analyzing the trade impact of GSP programs. The existing tariff structure makes this consideration even more relevant. While the United States, EU, and Japan might have average MFN rate as low as 5 percent, some products face tariff rate of above 100 percent into these markets. Importantly, tariff peaks (tariffs of above 100 percent) are very common in agriculture and food products. For example, the United States, the European Union, Canada and Japan apply tariffs of 120 % to ground nuts, 250 % to edible bovine offal, 340 % to butter and 170 % to raw cane sugar. While the preference margin in such tariff peaks are low (Hoekman, Ng and Olar-

[23]See Santos, Fariah and Cunha (2005) for a detailed historical overview of the establishment of the GSP programs

reaga 2001), they are significant as these items are important export items from some LDCs. While there is empirical research that has focused on particular products or beneficiaries, to our knowledge, sector level and product level differences have not been previously accounted for in a comprehensive evaluation of the GSP program.

Existing studies on GSP institutional arrangements and associated limitations largely highlight the fact that GSP programs do not cover the sector/products in which GSP recipients have comparative advantage. (See, for example, Ray 1987, Devault 1996, Grossman and Sykes 2005.) Further, studies claim that although GSP provides tariff preferences, the quantitative restrictions it places on product eligibility and quota ceilings on "sensitive items" may be detrimental to program recipients (Hoekman and Kostacki 2001, Finger and Winters 1998, Macphee and Rosenbaum 1989). In addition, technical incapacity of low-income countries to follow all the rules of origin criteria would hinder exports, especially of processed products, even when the product is eligible under a GSP scheme (Dowlah 2008). Importantly as well, many studies claim that the graduation provision reduces the stability of the program and thus renders GSP an ad hoc tool that occasionally benefits industrialized countries rather than providing much needed market access to low-income countries (Herz and Wagner, 2011; Özden and Reinhardt 2005, Panagariya 2003).

Studies in this vein of literature have largely focused on assessing the US and EU GSP programs. One of the striking features of the US GSP program is its process renewal at the end of each contract period. This program has been renewed total of 11 times since it was implemented in 1976. Since this time, there were eight instances in which the program renewal did not get approved prior to its expiry, and program reauthorization retroactively reinstated program provisions. The current cycle which began in June 2015 is due to be renewed in December 2017. Several empirical studies indicate this lack of stability in GSP program authorization as trade hindering mainly because it reduces GSP utilization rates (see, for example, Gallezot and Bureau 2004, Stevens and Kennan 2004, Candau and Jean 2005). These results lead to the question of whether it is the GSP program, or a lack thereof, which is actually trade reducing. This question is of strategic importance because GSP program coverage and preferences have changed over years and, as a consequence, so might the market access conditions for products originating in lower income countries. Interestingly, no empirical and theoretical research has addressed this question.

A handful of studies make reference to preference margins in the context of utiliza-

tion of the GSP programs. Manchin (2006) claims that the African, Caribbean and Pacific (ACP) preference is utilized only if the difference between the MFN and the ACP preference rate is at least 4 percent. Manchin used a threshold technique developed by Hansen (2000) to endogenously find a threshold preference margin value, which identifies sub-samples of those that utilize their preference and those do not. Further, Manchin claims probability that the preference is utilized is higher for agriculture, textile and clothing sectors exports while lower for machinery and minerals products, and links the utilization of a preferential program to the preference margin it offers. However, this study was not specifically designed to measure the preference margin but to assess the determinant of preferential exports. A few studies that empirically measure preference margins are discussed below.

Alexandraki and Lankes (2004) measure the preference margin as the percentage of the unit price a preference recipient received for a particular product which exceeds that received by a MFN exporter. There are important limitations of this method as well. First, any difference in exports is fully attributed to difference in preference margin. Second, this method is indifferent to the degree of utilization of the preference scheme. Bouët et al. (2005) quantify the preference margin as the difference between an exporter's and the world's average preferential margin, defined as the weighted average across products of the difference between the MFN and the applied rate. This approach, however, does not consider how responsive a product is to a change in tariff preferences and thus the price. Candau and Jean (2005) also use the direct difference between the MFN and preference tariff rate to measure the preference margin. These authors, however, also take into account the utilization rate by calculating the value of the rent arising from preferences rather than limiting to measure the preference margin as below:

$$V_j = \sum_i (mfn_i - pref_{ij}) M_{ij} util_{ij}^{pref} \tag{1.1}$$

where V_j is the value of rent arising from providing tariff preference $pref_{ij}$ to partner j, M is the dutiable imports of product i from partner j, and $Util$ is the corresponding utilization rate.

Findings of most of these studies find preference erosion owing to regionalism or burgeoning preference programs only in passing. As more suppliers receive tariff preferences in a given market, the absolute value of preference margin may not reflect the actual extent of preference a country receives. Analogous to consumer theory where

an economic agent bases his decision on relative prices, an exporter's decision may also be expected to depend upon relative preferences it receives in the market (that is the tariff preference of its competing suppliers is expected to matter). Further, in the context that the GSP effect is measured using gravity equation-which relies heavily on expenditure function of all the countries in the world, it is even more important that the relative preference margin be taken into account. As such, it is surprising that none of the studies examining GSP effect attempt to measure the effect of this preference margin with respect to competing suppliers. One compelling reason for this might be due to the lack of a theoretically consistent observable, and measurable variable to capture this effect.

To summarize, while the GSP has been implemented for more than four decades, the performance of this preferential program remains ambiguous. Further, at least three significant gaps remain in the empirical literature examining this issue. First, the sector level and product level differences, as implemented through the system of preferences, have not been thoroughly considered in evaluations of the GSP program. Second, the GSP literature lacks a quantitative tool to measure preference margin offered up by the GSP programs relative to other trade preferences. Third, the relative preference margin with respect to preferences offered to competing suppliers has not been taken into account in evaluating GSP. This study seeks to contribute to the GSP literature by using a more nuanced model specification and proposing an enhanced analytical approach to assess the value of preferences offered through this program. In doing so, the actual effectiveness of the GSP program will be accurately assessed.

1.6 Research Objectives

The overall goal of this dissertation is to re-evaluate the global GSP program and to explore whether low-income countries have achieved an increased access to high-income markets as a result of unilateral and non-reciprocal tariff preferences offered to their exports. Specifically, the research objectives of this dissertation are as follows:

> Objective 1: To review the GSP program and to re-assess the performance of the GSP program on developing country primary and processed agricultural trade;

Objective 2: To theoretically develop and empirically estimate exponential tariff indices to measure the extent of overall and relative tariff preferences offered to a particular exporting country;

Objective 3: To re-evaluate the extent to which the GSP program is sensitive to changes in market access conditions- overall and relative to competing suppliers.

1.7 Organization of this Dissertation

This dissertation is organized in three chapters. Chapter 1 (this chapter) introduces this dissertation and presents an overview of the GSP program. Chapter 2 presents an evaluation of the GSP program which specifically considers the products and markets where low-income countries' exports are concentrated. Objective 1 is addressed in this chapter. Chapter 3 presents two novel measures of preference margins offered by high-income countries to low-income countries through tariff reduction (Objective 2). These indices are then used in a gravity model to reassess the extent of market access offered to beneficiary countries through the GSP program (Objective 3). Taken together, this dissertation offers a unique and significant contribution to examining this important program.

Table 1.1: The GSP Programs

WTO's List of Preferential Trade Arrangements (PTAs) 2015				UNCTAD Report 2015	
GSP Program	GSP Type	GSP Provider	Effective*	GSP Program	Recipients**
GSP - Australia	GSP	Australia	1974	GSP-Australia	167
GSP - Canada	GSP	Canada	1974	GSP-Belarus	152
GSP - European Union	GSP	European Union	1971	GSP- Canada	101
GSP - Iceland	GSP	Iceland	2002	EU-GSP	44
GSP - Japan	GSP	Japan	1971	EU-EBA	33
GSP - New Zealand	GSP	New Zealand	1972	EU-GSP+	45
GSP - Norway	GSP	Norway	1971	Iceland	150
GSP - Russian Federation, Belarus, Kazakhstan	GSP	Belarus; Kazakhstan; Russian Federation	2010	GSP-Japan	151
GSP - Switzerland	GSP	Switzerland	1972	GSP-Kazakhstan	139
GSP - Turkey	GSP	Turkey	2002	GSP-New Zealand	132
GSP - United States	GSP	United States	1976	Norway-GSP	132
Duty-Free Tariff Preference Scheme for LDCs	LDC-specific	India	2008	Norway-GSP+	35
Duty-free treatment for African LDCs - Morocco	LDC-specific	Morocco	2001	GSP- the Russian Federation	150
Duty-free treatment for LDCs - Chile	LDC-specific	Chile	2014	GSP-Switzerland	132
Duty-free treatment for LDCs - China	LDC-specific	China	2010	Turkey	175
Duty-free treatment for LDCs - Chinese Taipei	LDC-specific	Taipei, Chinese	2003	United States-GSP	126
Duty-free treatment for LDCs - Kyrgyz Republic	LDC-specific	Kyrgyz Republic	2006	United States-African Growth and Opportunity Act	42
Duty-free treatment for LDCs -Thailand	LDC-specific	Thailand	2015		
Preferential Tariff for LDCs - Republic of Korea	LDC-specific	Korea, Republic of	2000		
African Growth and Opportunity Act	Other PTAs	United States	2000		
Andean Trade Preference Act	Other PTAs	United States	1991		
Caribbean Basin Economic Recovery Act	Other PTAs	United States	1984		
Commonwealth Caribbean Countries Tariff	Other PTAs	Canada	1986		
Former Trust Territory of the Pacific Islands	Other PTAs	United States	1948		
South Pacific Regional Trade and Economic Cooperation Agreement	Other PTAs	Australia;New Zealand	1981		
Trade preferences for countries of the Western Balkans	Other PTAs	European Union	2000		
Trade preferences for Pakistan	Other PTAs	European Union	2012		
Trade preferences for the Republic of Moldova	Other PTAs	European Union	2008		

Notes: Source WTO's PTA database (http://ptadb.wto.org/ptaList.aspx) and UNCTAD Report 2015 (see http://unctad.org/en/PublicationsLibrary/itcdtsbmisc62rev6_en.pdf)
* The program effective date
** The Number of GSP recipients for each scheme

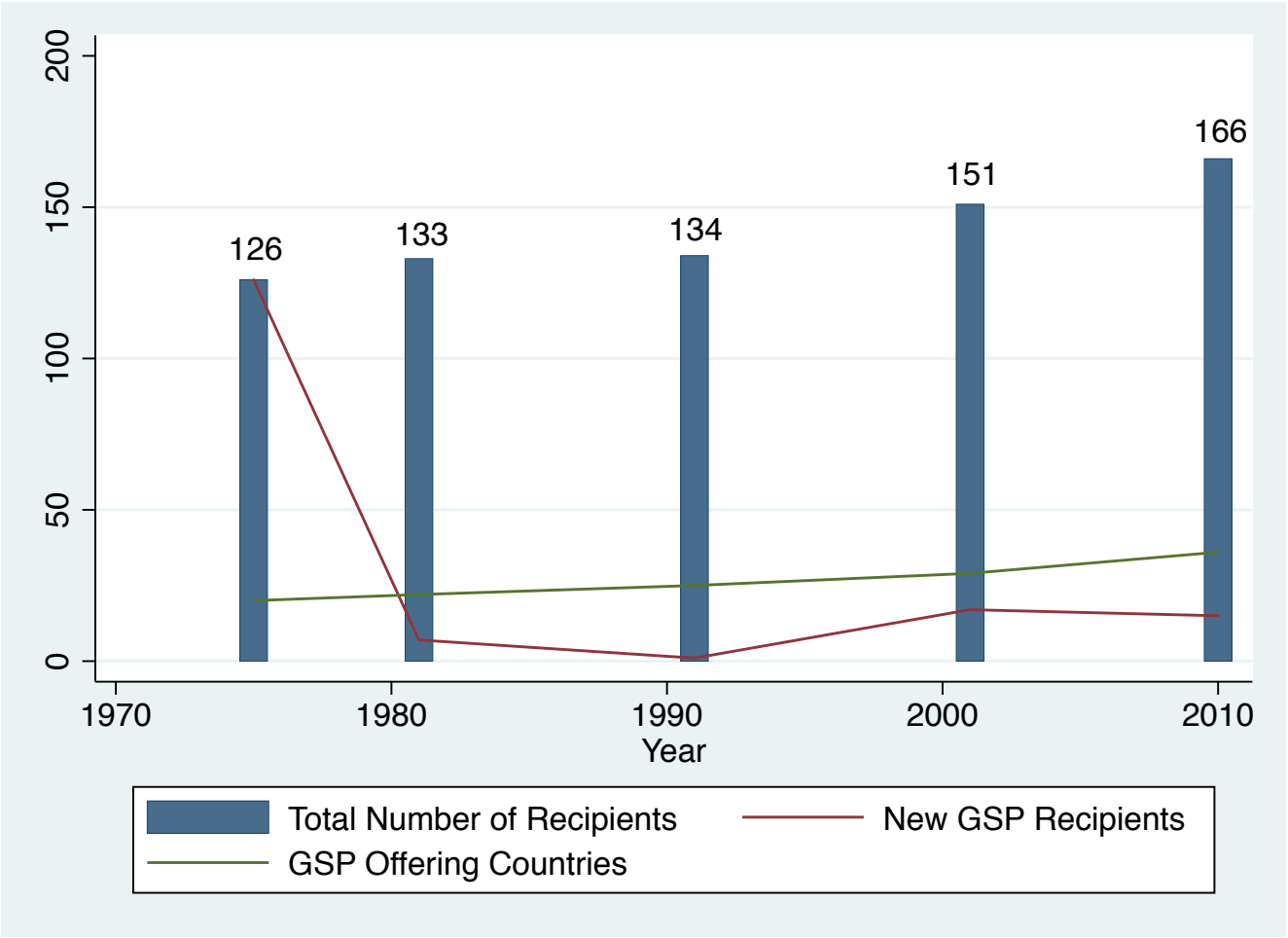

Figure 1.1: Number of GSP Receiving and GSP Offering Countries

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Chapter 2

Is the Generalized System of (Trade) Preferences Really a Dismal Policy Tool? Lessons from Developing Country Agricultural Trade

ABSTRACT

Recent empirical evidence on the effects of the Generalized System of Preferences (GSP) generally portrays a rather stark prediction for low-income countries: the preferential scheme has produced virtually no impact on beneficiaries' exports to high-income markets. In this research I show that this result, based on total merchandise trade, is misleading because it ignores the products and markets where low-income countries' exports are concentrated. Using a theoretically consistent gravity equation for primary and processed agri-food trade over the period 1962-2010, the results illustrate that the GSP program and modifications of it have delivered significant positive effects in developing countries' exports to developed country markets in agricultural trade but not necessarily so in non-agricultural goods. The findings are robust to different types of GSP programs, and recent advances in the specification and estimation of models of bilateral trade.

Keywords: *Agricultural Trade, Generalized System of Preferences, Gravity*

2.1 Introduction

The Generalized System of Preferences (GSP) is a unilateral trade liberalization program in which developed countries offer non-reciprocal tariff reductions (tariff preferences) on certain products imported from designated developing (DING) and least developed countries (LDC). The idea of non-reciprocity in tariff reductions is important in that GSP offers increased access to high-income markets for exports originating in low-income countries, but unlike in other preferential trade agreements the low-income countries are not required to reciprocate the preferential treatment to imports from these high-income countries. GSP is consistent with the World Trade Organization's (WTO) founding principle "Most Favored Nation (MFN) Treatment" by way of the "Enabling Clause". MFN treatment refers to the WTO principle in which countries cannot discriminate between trade partners; that is, if a country extends favorable treatment such as tariff reductions on a product to one partner then it has to extend the same reduced tariff on that product to all WTO members. The enabling clause is a special provision that allows developed countries to treat developing countries more favorably than other WTO members but also has provisions that does not allow a country to offer such favorable tariff reductions only to few of its 'friends'. With this legal basis, the GSP program was first implemented in 1971 by the European Economic Committee (EEC). Since then this program has been adopted by 43 countries. Each adopting nation has the latitude to tailor its GSP program by extending preferential trade access to particular countries and products; in general the product coverage and tariff reductions offered are greater in case of LDCs compared to DING countries. As of December 2015, the UNCTAD report shows that there are 200 countries and territories that receive GSP tariff reductions from one or more countries

In light of the features of this program including "non-reciprocity" of the tariff preferences, the World Trade Organization (WTO) considers GSP as an important tool in its approach to fostering economic development in low-income countries. This view is consistent with the founding objectives of the GSP program, which among others is to increase exports earnings for the less developed countries.[1] Developed countries

[1]Resolution 21 (ii) of UNCTAD II Conference in New Delhi, 1968 states that: "... the objective of the generalized, non-reciprocal, non-discriminatory system of preferences in favor of the developing

that offer GSP also consider this policy tool as an opportunity to help developing countries expand their exports. In addition, they acknowledge the possible benefits they receive from reduced prices of imported goods and the resulting increase in consumer's purchasing power. In this regard the U.S. trade representative, Michael Froman, made a following comment in his speech addressed to the U.S. Congress in 2013.

> "The Obama Administration urges Congress to extend this important trade program, which increases U.S. competitiveness, keeps costs low for U.S. consumers, and benefits some of the world's poorest countries"
> -Michael Froman, U.S. Trade Representative 2013

Besides, GSP administering countries periodically revise their GSP programs and renew their commitment to GSP recipient countries by claiming to ease program administration while benefitting the recipient countries. As an example, the 9th ministerial conference of the WTO, which resulted in trade agreements summarized as the "Bali Package", directly addressed concerns with easing the administrative processes of preferential programs through simplifying rules for identifying origin of a product and streamlining customs and port procedures.

While the GSP was envisioned to be a promising step towards economic development in low-income countries, and various measures have been taken in the four decades following its establishment to meet its founding goal, empirical research assessing the impacts of GSP on trade has produced mixed results. Truett and Truett (1989, 1997), for example, estimated effects of the US GSP program on imports of manufactured goods from Cyprus, Romania, Turkey and Yugoslavia to the United States. These authors found a positive and statistically significant GSP effect in all cases but for Yugoslavia. Murray (1973), in a comprehensive study of the then existing GSP programs, found that the GSP has no effect on trade. Baldwin and Murray (1977) questioned these results by disaggregating trade flows into those which were trade creating and trade diverting in a partial equilibrium-modeling framework. These authors predicted that GSP contributed to a 27 percent increase in trade flows for

countries, including special measures in favour of the least advanced among the developing countries, should be: (a) to increase their export earnings; (b) to promote their industrialization; and (c) to accelerate their rates of economic growth." (UNCTAD website 2015, see `http://unctad.org/en/Pages/DITC/GSP/About-GSP.aspx`)

the US GSP programs and a majority (80 percent) of this trade was through trade creation. Sapir and Lundberg (1984) suggest a positive link between the GSP and trade but found the magnitude to be economically small (0.6 percent). Similarly modest results are found in Brown (1987) and MacPhee and Oguledo (1991,1994).

A notable number of empirical studies report negative GSP trade effects. These studies often cite complex rules of origin (RoO) criteria, competitive need limits (CNL)[2], and worker rights conditions as problematic issues that constrain potential benefits of GSP (Feenstra et al. 2010, Grossman and Sykes 2005, Reynolds 2005, Devalult 1996, MacPhee and Rosenbaum 1989). For example, Devault (1996) showed that the competitive need limits reduce imports of GSP donor countries by ten to 17 percent. Limão (2007) proposed that a switch from a unilateral preference to an import subsidy scheme would generate an annual net welfare gain of ten percent. Written more than three decades after the implementation of the GSP program, Hoekman et al. (2005) provide a detailed survey of the studies evaluating GSP programs. They hold that the GSP programs are not trade increasing and point two important reasons offered for the failure of the GSP programs. First, the tariff reductions and products are selected unilaterally by GSP providing countries and second, GSP tariff preferences were removed once the beneficiary countries increased their exports considerably. Reynolds (2005) also found that GSP programs have a negative effect on trade and that it varies across countries. This research has led to many research papers investigating GSP utilization rates and potential linkages between program utilization rates and the GSP trade effect. Bureau et al. (2007) analyzed the utilization rate of European Union and the United States GSP schemes (among others) for agricultural products. They concluded that the rates of utilization are generally high, with less than 10 percent of eligible imports entering the U.S. and E.U markets outside of the GSP regime.

All of the research discussed above focus on individual GSP programs, selected sectors or commodities, or a few recipient countries. The results from these studies thus cannot offer a generalized understanding of the GSP program. Herz and Wagner's [hereafter HW] (2011) paper titled "The Dark Side of the Generalized System

[2]CNL is a feature of the US GSP program. Under this rule, a GSP-beneficiary country loses GSP treatment for a product if its exports to the donor country exceed either a certain percent of the value of the total imports of the product or a certain dollar value adjusted with the growth of the GSP granting country's Gross National Product (GNP). For example, this dollar value was $165 million in 2014, while the percent threshold was 50% of the current total US imports for 2014.

of Preferences" offers one of the most comprehensive recent studies of the GSP program. Findings of this study, however, placed the value of the GSP program squarely in doubt. Pooling across all country GSP programs and controlling for possible learning-by-doing effects to adhere to RoO requirements, these authors evaluate the trade effect of the GSP program over the period 1953-2006. Incorporating recent advances in the specification and estimation of the gravity equation to deal with zero trade flow issues, HW (2011) not only concludes that the GSP hampers recipient country exports in both the short and the long run, and that of donor countries in the long run, but also advocates for a complete abolition of the GSP program. HW, however, limit their focus to total merchandise trade. Given the relative predominance of agricultural goods in the exports of lower-income countries, the approach adopted by HW may have masked considerable and important heterogeneity in the GSP trade effects across sectors.

In this paper I aim to reconcile the apparent inconsistency between the GSP program's ambitions, and HW's conclusion regarding the "darkness" of GSP programs. For this purpose, I re-evaluate GSP programs at the sector level by including and explicitly considering products which lower- income countries trade more intensively. First, I assemble a panel of agriculture and non-agriculture trade flows from 1963-2010, and separately estimate the GSP effects on agricultural and non-agricultural trade. This distinction is important because of the relative predominance of agriculture products in the exports of lower-income countries and because agriculture sector products generally face a higher tariff rate than do non-agriculture products. As such, preferential trade treatment of products in this sector would be expected to significantly and positively impact trade. Second, I re-estimate the impact of the GSP program by specifically considering who exports which products and to which markets. This differentiation is important because countries differ significantly in their export composition, and the products which have been given preferential market access differ by donor and recipient country. As such, this variation may have implications on whether the GSP program delivers on its desired effect of increased market access for low-income countries.

As a preview of key results, I find that the GSP program has significantly increased agricultural exports from developing countries to high-income markets but do not necessarily increase the exports of non-agriculture goods. Further, the GSP effect is large and positive even for the LDC's when examining trade of primary agricultural products, the product group exported more intensively from this group of GSP

recipients. Furthermore, these findings are complemented using two case studies of the US and the European Union's (EU) GSP program. Results in this research are robust and incorporate recent advances in the specification and estimation of the gravity model.

The remainder of this paper is organized as follows. In Section 2.2, I provide a sector level gravity model of bilateral trade flows and the estimation technique, emphasizing the role of different variables in the model. In Section 2.3 I describe my data and their sources. In Section 2.4, I provide results and their discussion. Finally, in Section 2.5 I offer concluding remarks.

2.2 Model

A gravity model of international trade is used to assess the impact of GSP on bilateral trade flows. Using a standard derivation approach, following Dixit-Stiglitz (1977) and Anderson and Van Wincoop (2003), I derive a sector-level gravity equation[3]:

$$X_{ijs} = \alpha_{ijs} * t_{ijs}^{1-\sigma} \left(\frac{Y_{is} E_{js}}{\Omega_{is} Q_{js}^{1-\sigma}} \right) \tag{2.1}$$

where, X_{ijs} is expenditure of country j on all the products from sector s that are imported from country i, and α_{ijs} is a preference parameter for all the products in the sector supplied by country i to country j. The composite price, t_{ijs} is the price including tariff and non-tariff costs faced by consumers in country j for the goods imported from country i in sector s. Y_{is} is the exports from sector s to country i, and E_{js} is the expenditure on all sector s products in country j regardless of where the products originate. Q_{js} is the composite price index of all sector s in country j, and Ω_{is} reflects the outward multilateral resistance which measures real market potential for country $i's$ export of all sector s products and σ is the elasticity of substitution between all varieties in s.[4] The time subscript is suppressed in equation (2.1) for ease of notation.

[3] A detail derivation is presented in Appendix 1

[4] The varieties in s are assumed to be differentiated by source of origin.

In practice, E_{js}, which is a function of price index, is not observable and thus is assumed to be a function of total income in country j, i.e $E_{js} = GDP_j^{\beta_1}$ (Peterson et al. 2013). Assuming a homothetic utility function, the coefficient on GDP can be shown to equal one for total merchandise trade; however, for sector-based analyses this is not necessarily the case because the associated sub-utility function may not be homothetic (Peterson et al. 2012). Similarly, as Peterson et al. (2013) note, $GDP_i^{\beta_2}$ can be used as a proxy for Y_{is}. Replacing X_{ijs} with the value of exports, then, the export-value from i to j can be expressed in log-linear form as:

$$lnX_{ijts} = ln\alpha_{ijts} + (1-\sigma)lnt_{ijts} + \beta_1 lnGDP_{jt} + \beta_2 lnGDP_{it} + (\sigma-1)lnQ_{jts} - ln\Omega_{its} \tag{2.2}$$

I assume t_{ijs} reflects all trade costs. D_{ijt} is a vector of observable trade cost or facilitation variables and are stochastic due to unmeasured trade frictions $\left(\mu_{ijt}, N\left(0, \sigma_\mu^2\right)\right)$ between the country pairs for a given time period. More precisely, the vector D_{ijt} includes dummy variables representing whether countries i and j have contiguous boarders *(contiguity)*, whether trading pairs officially speak same language *(common official language)*, do trading partners have a colonial relationship (did countries have a colonial relationship after 1945 *(Colony post 1945)*, is the country currently colonized by its trading partner*(currently colonized)*, did members of the country pair ever belong to the same colony-*common colonizer*), logarithm of a country's land area *(Log area of importer, Log area of exporter)*, geographical status *(island importer, island exporter, landlocked importer landlocked exporter)*,GDP per capita *(GDPPC)* of country pairs *(Log GDP per capita importer, Log GDP per capita exporter)*, and real exchange rate between country pairs *(RER)* and different policy treatment status. Further, a continuous variable representing natural log of geographical distance between given trade partners (dist) is also considered an observable trade cost variable. Then, I can write $(1-\sigma)\, t_{ijts} = \sum_l \gamma_l D_{ijt} - \mu_{ijt} - \delta_1 lndist_{ij}$.

Several policy variables ($g_{ijt} \subset D_{ijit}$) are also included in the baseline analysis. Although the primary variables of interest are related to the GSP program, because empirical research has shown that the membership in regional trade agreements and WTO can lead to increased trade, omitting these variables might bias the GSP coefficient in an unknown direction. As it has been demonstrated that these policies can have asymmetric effects on trade for each trading partner (Subramanian and Wei 2007, Grant and Boys 2012), separate variables are used to reflect exporter and importer policy participation. WTO membership status (Both in WTO, Importer in WTO, Exporter in WTO), regional trade agreement membership status *(Importer in*

RTA, Exporter in RTA) are included for each trading pair. Variables which decompose GSP participant status by those who offer and receive preferential treatment *(GSP recipient exports, GSP donor exports)* are included and are particularly relevant to this analysis. This decomposition will allow me to investigate the GSP impacts by considering where the low-income countries' exports are destined and allows us to test whether low-income countries truly benefit from exporting to the GSP preference-granting countries.

The three classes of the GSP program are also separately evaluated: GSP offered to developing countries (GPT), GSP offered to least developed countries *(LdcGSP)*, and GSP offered through another criteria *(TGSP)*. When these GSP program variables are decomposed to separately reflect donors and recipients, 6 distinct GSP variables[5] are included in this analysis *(GPT Recipient Exports, GPT Donor Exports; LdcGSP Recipient Exports, LdcGSP Donor Exports; TGSP Recipient Exports, TGSP Donor Exports)*. For a benchmark comparison, all these classes of GSP programs are pooled together which allows me to investigate an average GSP affect across all classes of GSP *(GSP)*. Further, I also disintegrate this variable to analyze the exporter effect *(GSP Recipient Exports, GSP Donor Exports)*.

To examine potentially different GSP effects due to heterogeneity in export composition across types of exporters, an indicator variable reflecting whether the traded good is a primary (primary) or a processed product is also included. This variable is interacted with the GSP program and participant type to analyze how responsive a recipient in particular class of GSP is to exports of primary products.[6] Considering the example Primary* GPT Recipient Exports, the coefficient on the first interaction variable shows additional increase (decrease) in developing country recipient's exports of primary products to developed countries as compared to non-recipients.

Equation (2.2) consists of two price indices, Q_{jt}^{s} and Ω_{it}^{s} which are not directly observable. Not accounting for these indices would subsume this variance into the error term and could potentially result in generating biased estimates. Anderson Van Wincoop (2003), and Feenstra (2004) recommend using time-varying country specific fixed effects (Importer-Time Fixed Effects, and Exporter-Time Fixed Effects)

[5]Construction of these variables is described in the data section.

[6] These variables are: 1. Primary* GPT Recipient Exports; 2. Primary*GPT Donor Exports; 3. Primary LdcGSP Recipient Exports; 4. Primary* LdcGSP Donor Exports; 5. Primary*TGSP Recipient Exports; 6. Primary*TGSP Donor Exports.

to control for this variance. However, Baldwin and Taglioni (2006) discuss in detail the benefits of using country pair fixed effects rather than country specific fixed effects. Following this recommendation, I use country pair (u_{ij}) and time (λ_t) effects separately to account for the unobservable price indices. To align with the use of unidirectional trade flows for dependent variable, I use the country pair fixed effect of the form $u_{ij} \neq u_{ji}$ as in Grant and Boys (2012).

Estimating equation (2.2) in log-linear form is straightforward if the dependent variable is strictly positive values; this, however, which is clearly not the case for trade data. Silva and Tenreyro (2006), Helpman, Melitz and Rubinstein (2008), and Grant and Boys (2012) provide evidences that ignoring zero flows leads to biased estimates because logarithmic transformation of the dependent variable ignores zero flows and thus results in sample selection bias. Gong and Samaniego (1981), Gourieroux et al., (1984), Silva and Tenreyro (2006), Westerlund and Wilhelmsson (2011) provide extensive theoretical and empirical evidences that Poisson (pseudo) maximum likelihood (PPML) estimators are superior to other estimators in presence of zero trade flows. Therefore, I use this estimator as my preferred specification. I also consider other specifications to assess the robustness of these results. First I use fixed effect least square estimation where the dependent variable is scaled by a one unit logarithmic transformation of the dependent variable. Since the magnitude of this scaling is *ad hoc*, negative binomial fixed effect estimators and Zero-Inflated Poisson (ZIP) specification are also assessed for comparisons. Further, the GSP variable might not be purely exogenous in this case: that is a country may lobby important actual or potential developed country trading partners for GSP preferences.Should this be the case, then the GSP indicator variable could be correlated with the error term because unobserved characteristics might simultaneously explain why it exports a lot with the partner and why it is more likely to receive GSP benefits. An instrumental variable approach would have been appropriate to address this endogeneity. However, finding an instrument that is correlated with the GSP but not with trade is difficult. In panel data analyses of trade flows it is customary to use country-pair fixed effects to overcome this problem; in this case as well country-pair effect is used to overcome part of this endogeneity issue.[7]

[7]Alternatively, one could use the Generalized Method of Moments with lagged variables serving as instruments for current differences and vice versa. However, this method is sensitive to number of lags used.

The specific model used for sector-level analysis is thus:

$$X_{ijts} = exp\Bigg(u_{ij} + \lambda_t + \beta_1 lnGDP_{jt} + \beta_2 lnGDP_{it} + \delta_1 lndist_{ij} + \sum_l \gamma_l d_{ijt} + \sum_m \phi_m g_{ijt} + \sum_f \alpha_f GSP - donor - exports_c + \sum_h \chi_h GSP - recipient - exports_c \Bigg) e_{ijts} \tag{2.3}$$

where e_{ijts} is the stochastic term and s refers to either agriculture or non-agriculture sector products.The above econometric model is different from the specification (2.2) in that, here I partition the trade cost/facilitation vector D_{ijt} into GSP variables, other exogenous policy variables (g_{ijt}) and other gravity model covariates (d_{ijt}) introduced above. Note the use of subscript c to indicate the various classes of GSP programs. All other notations are as mentioned above

Further, to separately evaluate the effect on exports of primary products, the product category which is more intensively exported by least developed countries, a more flexible specification as below is estimated:

$$X_{ijtk} = exp\Bigg(u_{ij} + \lambda_t + \beta_1 lnGDP_{jt} + \beta_2 lnGDP_{it} + \delta_1 lndist_{ij} + \sum_l \gamma_l d_{ijt} + \sum_m \phi_m g_{ijt} + \sum_f \alpha_f GSP - donor - exports_c + \sum_h \chi_h GSP - recipient - exports_c + \sum_g \omega_g primary * GSP - recipient - exports_c + \sum_n \eta_n primary * GSP - donor - exports_c \Bigg) e_{ijtk} \tag{2.4}$$

where e_{ijtk} is the stochastic term associated with product level analysis and k refers to primary or processed agriculture products. All other notations are as introduced above.

2.3 Data

The analysis is accomplished with unidirectional trade flows (imports) on a nominal basis to control for false deflation of trade values. The details of this type of error can be found in Baldwin and Taglioni (2006). International trade data is obtained from United Nation's Comtrade Database (UNCTAD) for imports and exports for 185 countries over the years 1962 to 2010. These countries along with their three digit ISO code are listed in the Appendix 2. This data is disaggregated up to 4-digits Standard International Trade Classification's (SITC) product categories based on SITC revision 3. UN's guidance on SITC classification is followed for classification of products into agriculture and non-agriculture sector and into primary and processed agricultural products (United Nations Statistic Division 2015).[8]

Unidirectional trade flow data are quite liable to false zeros because if a country pair is in trading relationship but does not report a trade value for a particular product for a particular year, the flow is reported as zero. To address this problem, following Feenstra et al. (2003), mirrored trade flows of the partner country are used to fill in missing information. Further, the dataset is zero inflated to avoid selection bias. For this purpose, trade at the product level (primary or processed) is identified for each trading pair using the approach proposed by Besedes and Prusa (2011). For example, if a country pair trades at least five years in the total sample, the zero flows is retained for the year when zero flows are reported; if not zero flows are omitted from the data. After adopting this approach, approximately 43 percent of the observations in our data set report zero flows. The final data set is thus an unbalanced panel.

Other control variables in the gravity equation are derived from standard sources. GDP, population and exchange rate data are obtained from the World Bank database on development indicators.[9] WTO and RTA data are retrieved from WTO's database on *WTO members and observers,*[10] and *regional trade agreement information system*[11], respectively. Geographic distance, area, borders, language and colony are ac-

[8]United Nations Statistic Division. 2015. Detailed structure and explanatory notes: Standard International Trade Classification, Rev.3. Accessed at: `http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=14`

[9]Accessed at: `http://databank.worldbank.org/data/reports.aspx?Code=NY.GDP.MKTP.KD.ZG&id=af3ce82b&report_name=Popular_indicators&populartype=series&ispopular=y`

[10]Accessed at: `https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm`

[11]Accessed at: `http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx`

cessed from Centre d'Etudes Prospectives et d'Informations Internationales'(CEPII) database on *GeoDist* available in geography section.[12] Unique to this database is the construction of the GSP variable.

For coding the GSP programs, first a comprehensive list of the entire existing non-reciprocal and non-blanket program is made from UNCTAD and WTO's PTA database.[13] The lists of GSP granting and beneficiary countries are accessed from the earliest possible handbooks[14] on Generalized System of Preferences of each donor country (for e.g., GSP handbook on the scheme of Norway 1999; handbook on the scheme of the Republic of Poland 1999; handbook on the scheme of Australia 2000, etc). This list is then supplemented with the data from the most recent handbook when available. Information on type of GSP preference a country receives and when it started receiving GSP treatment is also included in this list. Then, update on the new membership status is relied on the UNCTAD newsletters. A total of 18 handbooks (UNCTAD 1998, 1999a, 1999b, 1999c, 2000a, 2000b, 2001a, 2001b, 2003, 2007, 2008a, 2009b, 2010, 2011a, 2013a, 2013b, 2013c, 2013e) and eight newsletters (UNCTAD 2002, 2005a, 2005b, 2005c, 2008b, 2009a, 2011b, 2013d) were referred to in developing this list. Further, this list is supplemented with WTO's database on preferential trade agreements and WTO news updates. Based on the type of GSP program a country receives from a GSP granting country, an inventory of the three types of GSP programs is developed.

2.4 Results and Discussion

In this section below I first provide descriptive summary of the tariff and trade differences across GSP recipient and non-recipient countries. I also provide statistics for non-agriculture sector for comparisons. Then in section 2.4.2 I turn to describing the empirical results.

[12] Accessed at: `http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp`
[13] Accessed at: `http://ptadb.wto.org/ptalist.aspx`
[14] Accessed at: `http://unctad.org/en/Pages/DITC/Handbooks-on-the-GSP-schemes.aspx`

2.4.1 Descriptive summary of tariff and trade differences across GSP recipients and non-recipients, and across sectors

Figure 2.1 explores average differences in GSP tariff reduction between aggregated sectors for the years 2000 through 2008. Average applied tariff rates on goods exported from beneficiaries and non-beneficiaries of the GSP program are presented for the agricultural and non-agricultural sectors in the left and right panels respectively. If there the GSP program had generated significant tariff reduction we would expect a difference in the applied tariff rates between GSP recipients and non-recipients. In the case of the agricultural sector, there is a notably lower tariff rates for GSP recipients than for non-recipients. This same pattern is also generally true for the non-agricultural sector. There are also important differences between the average applied tariff rates of traded products in these aggregated sectors. For example, in the year 2008, non-recipients face a tariff rate of about 17 percent in case of agriculture sector but barely of 3.5 percent in case of the non-agriculture sector. As the agriculture sector faces higher tariff rates in general, and the differences in tariff rates between recipients and non-recipients is also larger for the agriculture sector, the GSP could be expected to have a greater effect on trade in this sector.

Given that there are differences in trade liberalization benefits offered to developing and least developed countries, in figure 2.2 I explore the differences across these recipient countries for the agriculture sector. For the purpose, I categorize the percentage of goods exported in a given tariff range into five continuous bins; the x-axis values shows upper limit of the tariff rate for each bins. For example, 0 in the x-axis represents the share of agricultural sector product lines which are exported to GSP preference-granting countries without duties. Similarly, 5 in the x-axis denotes the exports with tariff rate of 0 to 5 percent and >50 represents the exports with tariff rate of greater than 50 percent. As can be seen in this figure, the share of duty free exports is higher for LDCs. Focusing on year 2000, LDCs exported 50 percent of their goods duty free while in the same year DING countries exported about 30 percent of their goods duty free. By the year 2008, LDC GSP recipients exported 80 percent, and DING countries exported 45 percent of their goods duty free. While these benefits may be due to other trade provisions offered through the WTO or other trade agreements, these results do suggest that the GSP program's benefits may not be "dark" if this heterogeneity in benefits developing and least developed countries receive is considered.

While less developed economies generally trade primary products more intensively, their developed counter-parts, with higher technical capacities, engage in relatively more trade of processed goods. It is therefore possible that the differences in average applied tariff rates by country development status observed in figure 2.2 may have been driven by the differences in export baskets to high-income countries. Figure 2.3 demonstrates the differences in the value of exports of primary and processed agricultural goods from 1971 to 2010 for GSP recipient countries. The panel I of the figure 2.3 represents export values for LDCs and the panel II illustrates the same for DING countries. As anticipated, this figure demonstrates that LDCs mainly export primary agricultural products. Further, LDCs increased their exports of primary products to developed countries from about \$0.5 billion in 1971 to about \$4 billion USD in 2010, while their exports of processed products to developed countries stayed around \$0.5 billion throughout the entire sample period. In contrast, developing countries exports of processed products to industrialized countries increased from less than \$2 billion to about \$70 billion USD in the same time period. Noteworthy as well, there is a reversal in the pattern of exports for DING countries; until 1995 they mainly exported primary products, but after this point their processed product surpassed their exports of primary goods.[15] The difference in the export basket composition between primary products for DING countries is not as stark as for LDCs. In short, the LDC exports to high-income countries mainly consists of primary products, and their DING country export a more balanced portfolio of both primary and processed products.

I next explore where the exports of low-income countries' agricultural products are destined. Figure 2.4 illustrates the export market shares for least developed countries through the sampling period (1971 to 2010) at five-year intervals. For this purpose, I compute share of exports destined to a market for LDCs (Panel 1) and developing countries (Panel 2) by disaggregating the destination markets into two categories. The first category combines European Union (EU) and US agricultural markets to reflect industrialized markets, and the second category portrays the total share in all other markets. Depending upon the year under consideration, 60 to 85% of agricultural exports from least developed or developing countries are destined for high-income GSP providing countries. Panel 3 depicts the share of agricultural im-

[15]Interestingly, the year of reversal coincides with the Uruguay Round which officially distinguished least developed countries from developing countries and allowing for expanded product coverage and tariff reductions.

ports from LDC and DING country GSP recipients into EU and US markets. This is important because under GSP programs, low-income countries do not have to reciprocate the tariff reduction or custom free treatments they receive from industrialized countries. As can be seen, more than 32 and 44 percent of imports to EU and US agricultural markets respectively come from lower income countries. While these market shares are not precise measures of the GSP benefits, they do suggest the importance of the GSP program from both the recipient and proving country's perspectives.

These stylized facts provide evidence of heterogeneities in GSP programs and forms the basis of this study. This analysis continues by re-examining the impacts of GSP programs by considering these heterogeneities–the products and markets where low-income countries' exports are concentrated.

2.4.2 Econometric Results

The results are organized into five subsections. First, HW's (Herz and Wagner 2011) model is applied to agricultural and non-agricultural trade to evaluate the GSP programs. The next section examines several heterogeneity in GSP programs, including DING country recipients' versus the LDC recipients, and exports of primary versus processed products. Further below, the GSP effect is investigated considering the heterogeneity associated with the export product composition. Then in the next subsection the robustness of these estimates is further explored using negative binomial estimators. Finally, these findings are complemented using two case studies of the US and the European Union's (EU) GSP program.

Average GSP Effect on Total Merchandise Trade and Sector Level Trade

The GSP was founded with an ambition to increase exports from low-income countries to high-income countries. However, in their 2011 article - "the dark side of the Generalized System of Preferences" - Herz and Wagner (2011) concluded that the GSP not only hampers exports from the GSP recipient countries but also decreases exports from the GSP providing countries as well. Thus, HW recommended complete abolition of the GSP program. To put this into perspective, HW's analysis

was based on total merchandise trade and reported that an average recipient traded about two to 22 percent lower than a non-recipient did. Here, their model is applied to total merchandise trade, and to agricultural and non-agricultural trade separately. Table 2.1 presents these results. Column [1-3] report estimates from total merchandise trade, while column [4-6], and column [7-9] report results from non-agriculture sector and agriculture sector respectively. In each cases, the estimates in first two columns use only the positive trade flows while the third column incorporates zero trade flows as well. Turning to the results, the standard gravity equation explanatory variables such as GDP, distance, contiguity, colonial relationship and common language take the expected sign and are statistically significant. The coefficients on GDP, although not unitary, are positive and closer to one than zero. As expected, trade flows decrease with the distance and area of the exporter, while sharing border, being members in a Regional Trade Agreement, both being WTO members, having a common official language or having colonial ties increases the trade between partners, ceteris paribus.

Indeed, if the differences across sectors are not taken into account, the results show that the affect of the GSP program on trade is insignificant [column 1-3]. The fixed effect OLS estimate [column1, FE-OLS), although statistically insignificant, produces a negative coefficient of magnitude 0.01. An economic interpretation would be on an average exports from a recipient is about one (exp(-0.01)-1)*100) percent lower compared to that of a non-recipient. In the most preferred ppml specification which incorporates zero flows [column 3], I again find that the GSP effect on total trade is non-significant. This implies that there is no evidence that the GSP promotes exports from the low-income countries. These results, however, change when the data is disaggregated into agriculture and non-agriculture sectors. Unlike in non-agriculture sector [column 4-6], an average GSP-recipient is likely to trade 75 ((exp(0.56)-1)*100) percent more agricultural products than a non-recipient does [column 8-9]. These results are not unexpected given that many donor countries have progressively prioritized trade liberalization in agriculture sector post Uruguay round agreement in agriculture and that the tariff differences across recipients and non-recipients is greater in agricultural products. As will be seen, these results are robust across specifications.

GSP Effect Considering Heterogeneity in GSP Programs

As discussed earlier not all the classes of the GSP program are similar in terms of tariff reduction, product coverage or country selected. As a reminder, three different classes of GSP are *GPT*-specific to DING countries, *LDC GSP* -specific to the LDCs, and *TGSP* - to other countries. I explore these differences in agricultural and non-agricultural[16] sector separately. Further, to ensure that the product effect does not confound this effect, I investigate the heterogenous GSP effect in primary and processed agricultural products separately as well.

The results on heterogeneity among classes of GSP programs along with various statistical tests (H1-H10) are presented in table 2.2. Rows and columns are numbered for ease of comparisons. Rows 4 to 11 report coefficients of interest. Before engaging into the details of the GSP effect, I find that the gravity equation variables are all significant and of expected sign and magnitude. Turning to the GSP effect, in column 1 and 3, I assume that all the GSP classes have promoted the recipients' exports equally. This effect is captured through the variable - *GSP recipient exports*. For example, in case of trade of primary agricultural products [column 1 row 10] the coefficient takes a value of positive 0.65, this implies that an average GSP recipient exports double the amount of these goods exported by a non-recipient. Similarly, the coefficient takes a value of positive 0.47 in case of trade in processed agricultural products [column 3 row 10]. This coefficient implies that, compared to a non-recipient the GSP recipient's exports of processed agricultural products increases by approximately 60 percent.

Now in columns 2, 4 and 5 I relax the restriction that the GSP effect is same across all three GSP classes. The GSP effects realized by the DING countries are captured using *GPT recipient exports* and that realized by the LDCs are captured using *LdcGSP recipient exports*. Since primarily I want to see differences in trade benefits across GSP classes, it is illustrative to first compare rows within a column and then move across columns. Focusing on trade of primary agricultural products, that is column 2, the coefficient on *GPT recipient exports* suggests that exports of primary agriculture products from a DING country increases by about 88 (exp(.63)-1) percent compared to a non-recipient. Turning to the coefficient on *LdcGSP recipient exports*, also in column 2 [row 6], I find the effect is negative and that LDCs exhibit

[16]Non-agriculture sector is included for comparison rather than analytical purpose; therefore I do not engage in disaggregate level analysis in this sector.

an under-trading effect of 21 (exp(-0.19)-1) percent in case of primary agricultural products. As an example of further variation, another class of GSP recipients (*TGSP recipients*) exports about 20 percent (column 2 row 8) more of these goods to an industrialized market compared to a non-recipient country.

Similar heterogeneity in GSP classes is apparent in the trade of processed agricultural goods too. These results appear in column 4. For example, I find that the DING countries export 67 percent (row 4) more of these goods to developed countries than an average non-recipient does. In contrast, the LDCs show a large negative GSP effect, for example, they ship 80 percent less of these items than a non-recipient does. These heterogeneities are manifested in non-agricultural trade too [column 5, row 4-9]. By way of example, the *LdcGSP recipients exports* take a coefficient of minus 1.22 and is statistically significant. This coefficient implies that the exports are impeded by a 70 percent as compared to exports of a non-recipient. The coefficients on *GPT recipient exports* and *TGSP recipient exports* are not statistically significant.

In evaluating heterogeneities among the GSP classes, I so far focused on recipients' exports to high-income countries. Now, I evaluate these heterogeneities by exploring reverse flows, i.e. the exports from high-income to GSP recipient countries. Focusing on trade of primary agricultural products, that is column 2, the coefficients on *GPT donor exports* and *LdcGSP donor exports* exhibit a statistically insignificant and a negative effect on exports to low-income countries. As an example, while the exports to DING countries are not economically different from exports to average non-recipient [column 2 row 5], industrialized countries supply only about 22 (exp(-1.55)) percent of the amount exported to an average non-recipient to a LDC. Further, these results that the GSP effect varies by class and depending on who exports have been tested and supported by the hypotheses tests as shown in the table.

GSP Effect Considering Heterogeneity in Export Composition

Why then LDCs that are entitled to a special GSP treatment in principle are actually incurring a significant decline in exports? It might be associated with import side trade barriers such as rules of origin criteria or material content rule (see for e.g., HW 2011, Panagariya 2003) or these results might be reflecting LDCs supply side constraints. To investigate further, I explore the differences in the export-composition

across suppliers using the model specified in equation 2.4. For the purpose, I differentiate the GSP recipients by class because, as discussed in previous section, the DING and LDCs show different type of product composition in their export baskets. Further, the GSP effect might also vary across primary and processed agricultural products because the GSP recipients might have a different level of comparative advantage in these products. This specification is important because it allows me to test the hypothesis that the GSP effect is different across products for each class of GSP recipients. I also provide results where the GSP recipients are not distinguished by class as a benchmark. Table 2.3 presents these results along with various statistical tests (H1-H4).

The variables of interest are - *1. GSP recipient exports, 2. GSP donor exports, 3. primary* recipient exports and 4. primary* donor exports.* As an example, the coefficient on the first variable - *GSP recipient exports* shows an additional effect on exports for a GSP recipient; the coefficient on the third variable *primary* recipient exports* reveals an additional effect on exports of primary agricultural products for a GSP recipient. Other gravity equation variables are included but not reported for brevity. The results indicate that even when the GSP recipients are not distinguished by class, I am able to find a positive GSP effect of magnitude 0.3 which implies that on an average a GSP recipient exports 35 (exp(0.3)-1)) percent more than a non-recipient in agriculture sector [column 1 row 5]. Similarly, focusing on exports of primary agricultural products, an average GSP recipient exports 84 (exp (0.61)-1)) percent more of these products than a non-recipient [column 1 row 7].

Now, turning to exploring the differences in GSP effect across different classes of the GSP program, an even larger effect is found on exports of primary agricultural products in all cases except for the *GPT recipients*. In this later case, the GSP increased the exports by a 73 percent. Further, under another variant of the program - *TGSP* recipients exported about 3.5 (exp(1.52)-1) [column 4 row 7] times the amount exported by non-recipients annually. Even larger effect of magnitude 2.27 [column 3 row 7] is found in case of *LDC recipients*. Considering a hypothetical situation, this indicates that if the LDCs chose to export primary products rather than processed products, it would suffice to increase the annual world trade by LDCs in agriculture sector by more than 8 times. Importantly however, when I do not allow a differential GSP effect across products (which in case of least developed countries is to ignore that these countries mainly export primary agricultural products), I find a large negative GSP effect of the magnitude 0.47. This coefficient indicates that the GSP

reduces agricultural exports from least developing countries to developed markets by 91 percent. These results suggest that the GSP effect varies across products and have been supported by the hypotheses as shown in the table. Taken together, these results give an idea that even in the presence of supply side constraints, GSPs have trade enhancing effect for the less developed countries in agricultural trade if the focus is on primary agricultural products.

Robustness Check

While traditionally the gravity model was estimated in logarithmic form, Silva and Tenreyro (2006) has shown that the logarithmic transformed constant elasticity model is inconsistent in the presence of heteroskedasticity and proposed ppml estimators as robust alternate.[17] Considering these important issues I used ppml estimates in this research. Further, the trade models have a large number of zero counts and ignoring these zeroes leads to sample selection bias especially if they are associated with trade costs (Peterson et al. 2013). Therefore, I also presented estimates with zero inflated poisson model. The results presented above incorporate all these recent advances in the specification of the gravity model. However, many theoretical studies note that the performance of negative binomial is better because it allows for more general patterns of heteroskedasticity (see for e.g., Silva and Tenreyro 2006, Cameroon and Trivedi 2005 and Kennedy 2003). Therefore, robustness of the above results are evaluated with negative binomial estimates. Further, for comparison I report fixed effect ordinary least square estimations, where the dependent variable is scaled by 1 before logarithmic transformation to retain the zero flows. Each specification includes country pair and time dummies to control for unobserved heterogeneities. Table 2.4 presents these results.

As in previous analysis a significant and positive GSP effect is obtained in case of exports from the developing countries, and the least developed countries. The effect is particularly large in later case. For example, the GSP increases the exports of primary agricultural products and is 3.5 times higher in case of *Ldc GSP recipients* as compared to the exports from non-recipients. While the magnitude changes, the

[17]This heteroskedasticity stems from well known Jensen's inequality which in this case is as follows: $lnE(\epsilon_{ij}|x_i) \neq E(ln(\epsilon_{ij})|x_i)$ which means that the logarithm of an expected value of the stochastic error conditioned on vector x is not equal to the expected value of logarithm of the stochastic error term condition on vector x.

sign and significance level are generally similar as in our previous analysis.

Case Studies:The US and EU GSP Programs

In this section I investigate the impacts of two specific GSP programs-the EU GSP program and the US GSP program. The EU program has three main variants of the program-(standard) GSP, GSP+ and Everything But Arms (EBA) schemes. In this analysis, countries which receive 'GSP+' and 'Everything But Arms' preferences are included in the class *Ldc GSP recipients*. While those countries that receive standard GSP preferences under the EU GSP programs are classified as *GPT recipients*. Further, a few other countries although they do not fit into the above two groups still qualify for non-reciprocal tariff reductions into the EU market. For example, countries in the Western Balkans, Pakistan and Moldova. Taking a holistic approach in evaluating the available unilateral non-reciprocal preferential programs, I include this later type of GSP recipients as *TGSP recipients*. In terms of coverage and preferences the LDCs receive more generous preferences and expanded product coverage than the DING countries. Further, the European Commission (2015) notes that the tariff preferences received by this latter group of countries is similar to those received by LDCs and DING countries.[18]

The US GSP program offers GSP preferences to the developing and the least developed countries which are classified into the group *GPT recipients* and *Ldc GSP recipients*. Further, as in the EU GSP program, few other countries receive non-reciprocal tariff preferences into the US market. For example, the countries might be receiving non-reciprocal preferences under the African Growth and Opportunity Act, Andean Trade Preference Act, or the Carribean Basin Economic Recovery Act. Countries receiving preferences through such arrangements are classified as *TGSP recipients*. Unlike in the EU cases, all the eligible products qualify for duty free access into the market. Importantly, however, these programs differ in extent of their product coverage; this is greater for LDCs.

As in previous analyses, I allow for heterogeneity across GSP program class and also across products traded. I then use a Poisson (Pseudo) Maximum Likelihood Estimators to estimate a model similar to that described in presented Equation 2.4. Unlike

[18]Chapter 1 describes the EU GSP program in more detail.

the specification 2.4, however, this analysis does not include GDP of the importing country, time and country pair fixed effects are also included in this estimation.

The results are presented in table 2.5. These results broadly conform to the pattern observed earlier in case of DING and LDCs. For example, if we consider a world where the less developed countries supplied agricultural products to only EU or US, then the world trade of primary agricultural product is 65% (exp(-0.51)-1) less compared to that of trade in processed agricultural products. However with the GSP preferences, the exports of the primary products from developing countries would increase up to 63% in case of US GSP program and by 45% in the case of EU GSP programs as compared to non-recipients. An even larger positive effect is observed for exports of primary products from LDCs to the EU and the US. More specifically, with the US (EU) GSP program the LDC recipients exports of primary agricultural products to the United States (European Union) is 4 times (8) higher compared to that of a non-recipient. These results suggest that both of these programs have been successful in achieving their objective to facilitate trade from less developed to developed country markets.

2.5 Conclusion

The most comprehensive recent study on the GSP program by Herz and Wagner (2011) portrays the success of the GSP as being rather "dark". This study, however, the study used aggregated trade data. This paper questions the findings of this and other empirical studies that criticize the GSP program through systematic consideration of heterogeneities observed in GSP preferences across sectors, recipients, and donor countries. Of particular relevance I show that the differences in tariff rates available to GSP recipients and non-recipients is greater in case of agriculture sector compared to that of non-agriculture sector. Second, GSP programs offers greater product coverage and tariff reductions to the LDCs. Third, it is confirmed the LDCs exports to high-income markets mainly consist of primary agriculture products while the developing countries have a more balanced export portfolio of primary and processed products.

Considering a more comprehensive and disaggregated series of trade data, and differentiating GSP programs into different types, this study re-evaluates the effectiveness

of the GSP program. When the above three heterogeneities are addressed fully, I find that the GSP programs have delivered significant positive affect on GSP recipients' exports to high-income countries for agriculture products but not necessarily for non-agricultural products. For example, analyzing aggregate agriculture and non-agriculture sectors separately, I find that the developing country recipients' exports to high-income countries is 75 percent higher compared to that of a non-recipient in agriculture sector.

While supply side constraints might impede exports from less developed markets, GSP programs are still functional in those cases as well. I find that the GSP effect is very pronounced and positive even in the case of LDCs exports when considering primary agriculture product exports. These results imply that developing countries with a competitive advantage in agricultural product production benefited from GSP through expanded exports to developed markets while the least developed countries were encouraged to export products in which they have comparative advantage but would not otherwise be able to compete in the developed country markets. Results of case analyses of the EU and the US GSP programs also conform to these results.

The most recent US GSP program renewal was controversial. Some contended issues include whether or not to continue the preferences to emerging developing countries or to limit preferences only to the least developed countries. The results show that the US GSP program has increased exports from beneficiary countries. Further, and importantly, these findings also indicate that the US has benefitted from increased exports to its developing country beneficiaries. These results imply that the US GSP program has successfully achieved its original intent to stimulate trade (rather than aid). Similarly, the EU GSP program has also enhanced exports from the less developed countries but the EU itself does not necessarily benefit from increased exports to these beneficiaries. Given the fact that the primary purpose of the program is to encourage export led growth in less developed countries, the EU GSP program has also fulfilled its intended goal through its three different GSP schemes.

Considering the recent efforts to cut down on red tapes, ease rules of origin, and to realign the program to concentrate preferences to countries in need, the administrative complexity of the EU and the US program is expected to further decrease in future. Furthermore, growing efforts to stabilize the GSP program (for example the EU increased the renewal period from 3 to 10 years) encourages beneficiaries to modulate their utilization of this program to best suit their long-term trade needs

and strategy. To conclude, GSP is not a dismal policy tool and is expected to continue offering much needed non-reciprocal trade preferences to products originating in low-income countries.

Table 2.1: Core Regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Total Merchandise Trade			Non-Agriculture Sector			Agriculture Sector		
VARIABLES	No Zeroes		With Zeroes	No Zeroes		With Zeroes	No Zeroes		With Zeroes
	FE-OLS	PPML	PPML	FE-OLS	PPML	PPML	FE-OLS	PPML	PPML
Both in WTO	0.04	0.64***	0.56***	0.117**	0.63***	0.55***	-0.1	0.79***	0.66***
	(0.054)	(0.078)	(0.079)	(0.0559)	(0.085)	(0.086)	(0.066)	(0.073)	(0.072)
Importer in WTO	0.12**	-0.38***	-0.30***	0.0219	-0.33***	-0.23***	0.24***	-1.00***	-0.85***
	(0.05)	(0.074)	(0.075)	(0.0521)	(0.08)	(0.081)	(0.063)	(0.07)	(0.069)
Exporter in WTO	0.07	-0.24***	-0.15**	0.0553	-0.33***	-0.23***	0.18***	0.36***	0.55***
	(0.052)	(0.066)	(0.067)	(0.0542)	(0.072)	(0.073)	(0.065)	(0.066)	(0.065)
GSP recipient exports	-0.01	0.04	0.05	0.00103	-0.01	-0.01	-0.11	0.56***	0.56***
	(0.088)	(0.039)	(0.038)	(0.102)	(0.043)	(0.042)	(0.1)	(0.022)	(0.022)
GSP donor exports	0.08	-0.06**	-0.05*	0.0335	-0.05	-0.04	0.09	-0.18***	-0.16***
	(0.096)	(0.029)	(0.029)	(0.0902)	(0.031)	(0.031)	(0.132)	(0.031)	(0.03)
Importer in RTA	0.19***	0.04	0.04	0.179***	0.01	0.01	0.12***	0.14***	0.14***
	(0.023)	(0.037)	(0.037)	(0.024)	(0.04)	(0.04)	(0.018)	(0.029)	(0.029)
Exporter in RTA	0.24***	0.11***	0.11***	0.216***	0.10***	0.10***	0.12***	0.12***	0.12***
	(0.021)	(0.029)	(0.029)	(0.0218)	(0.032)	(0.032)	(0.018)	(0.029)	(0.03)
Log GDP importer	0.40***	0.94***	0.95***	0.500***	0.99***	1.00***	0.08***	0.50***	0.51***
	(0.05)	(0.011)	(0.011)	(0.0625)	(0.013)	(0.013)	(0.033)	(0.008)	(0.008)
Log GDP exporter	0.13***	0.82***	0.82***	0.114***	0.82***	0.82***	0.10***	0.77***	0.79***
	(0.025)	(0.008)	(0.008)	(0.0249)	(0.009)	(0.009)	(0.025)	(0.008)	(0.008)
Log GDP per capita importer	0.46***	-0.15***	-0.14***	0.582***	-0.13***	-0.13***	0.31***	-0.28***	-0.28***
	(0.032)	(0.014)	(0.014)	(0.0329)	(0.015)	(0.015)	(0.036)	(0.012)	(0.011)
Log GDP per capita exporter	0.14***	-0.19***	-0.19***	0.0421	-0.22***	-0.22***	0.25***	0.09***	0.08***
	(0.049)	(0.019)	(0.019)	(0.0588)	(0.02)	(0.02)	(0.039)	(0.009)	(0.009)
Log real exchange rate	-0.14***	0.21***	0.19***	-0.124***	0.22***	0.20***	-0.10***	0.16***	0.13***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.023)	(0.023)	(0.024)	(0.022)	(0.021)
Currently colonized		0.37***	0.39***		0.42***	0.44***		0.01	0.03
		(0.107)	(0.107)		(0.111)	(0.111)		(0.106)	(0.107)
Ever in colony post 1945		0.12***	0.13***		0.08*	0.08*		0.46***	0.48***
		(0.045)	(0.045)		(0.046)	(0.047)		(0.039)	(0.041)
Common colonizer		0.33***	0.31***		0.35***	0.34***		0.13**	0.09
		(0.086)	(0.086)		(0.091)	(0.091)		(0.057)	(0.056)
Log distance		-0.54***	-0.54***		-0.54***	-0.54***		-0.59***	-0.60***
		(0.012)	(0.012)		(0.012)	(0.012)		(0.01)	(0.01)
Log area of importer		-0.15***	-0.15***		-0.18***	-0.18***		0.13***	0.12***
		(0.009)	(0.009)		(0.01)	(0.01)		(0.008)	(0.008)
Log area of exporter		-0.03***	-0.03***		-0.02***	-0.02***		-0.14***	-0.14***
		(0.008)	(0.008)		(0.008)	(0.008)		(0.006)	(0.006)
Contiguity		0.72***	0.72***		0.72***	0.72***		0.79***	0.79***
		(0.035)	(0.035)		(0.037)	(0.037)		(0.03)	(0.03)
Landlocked importer		-0.27***	-0.26***		-0.22***	-0.22***		-0.73***	-0.73***
		(0.026)	(0.026)		(0.027)	(0.027)		(0.024)	(0.024)
Landlocked exporter		-0.22***	-0.22***		-0.18***	-0.18***		-0.63***	-0.63***
		(0.024)	(0.024)		(0.025)	(0.025)		(0.024)	(0.024)
Island importer		0.23***	0.22***		0.24***	0.23***		-0.30***	-0.30***
		(0.033)	(0.033)		(0.034)	(0.034)		(0.033)	(0.034)
Island exporter		0.17***	0.17***		0.16***	0.16***		0.28***	0.27***
		(0.027)	(0.027)		(0.029)	(0.029)		(0.04)	(0.041)
Common language		0.46***	0.46***		0.47***	0.47***		0.26***	0.26***
		(0.026)	(0.026)		(0.027)	(0.027)		(0.022)	(0.022)
Observations	299,190	299,190	377,964	286,839	286,839	373,339	227,852	227,852	305,811
R-squared	0.249	0.729	0.729	0.278	0.71	0.71	0.138	0.65	0.651
Pseudo log-likelihood		-4.91E+13	-4.96E+13		-4.72E+13	-4.78E+13		-8.03E+12	-8.30E+12
Chi2									
F stats	306.36			325.39			132.98		

Notes: ***, **, * denote significance at 1%, 5% and 10 % level, respectively. All the standard errors in parenthesis are robust. In FE estimates, S.E are clustered by country-pair and the dependent variable is in log form. In column 1 to 3, the dependent variable is aggregate (includes both agriculture and non-agriculture sector) trade flows between trading pairs for a given year. For column 4, 5, and 6 the dependent variable is non-agriculture trade flows between trading pairs for a given year. For column 7, 8 and 9 the dependent variable is agriculture trade flows between trading pairs for a given year.

Table 2.2: Heterogeneity in GSP Exporters

		Agriculture Sector				Non-Agriculture Sector
		Primary		Processed		
	VARIABLES	(1)	(2)	(3)	(4)	(5)
1	Both importer & exporter in WTO	0.53***	0.49***	0.88***	0.89***	0.56***
		(0.08)	(0.079)	(0.106)	(0.105)	(0.086)
2	Importer in WTO	-0.58***	-0.52***	-1.15***	-1.13***	-0.21***
		(0.078)	(0.078)	(0.102)	(0.101)	(0.08)
3	Exporter in WTO	0.58***	0.61***	0.52***	0.54***	-0.21***
		(-0.074)	(0.074)	(0.095)	(0.094)	(0.074)
4	GPT recipient exports		0.63***		0.51***	0.02
			(0.032)		(0.023)	(0.041)
5	GPT donor exports		0.002		-0.15***	0.001
			(0.044)		(0.028)	(0.031)
6	LdcGSP recipient exports		-0.19***		-1.61***	-1.22***
			(0.044)		(0.044)	(0.055)
7	LdcGSP donor exports		-1.55***		-0.76***	-1.02***
			(0.068)		(0.039)	(0.065)
8	TGSP recipient exports		0.18***		-0.95***	-0.93 ***
			(0.05)		(0.039)	(0.049)
9	TGSP donor exports		-0.19**		-0.43***	-0.54***
			(0.088)		(0.035)	(0.04)
10	GSP recipient exports	0.65***		0.47***		
		(0.032)		(0.024)		
11	GSP donor exports	-0.06		-0.21***		
		(0.043)		(0.028)		
12	Log GDP importer	0.43***	0.42***	0.56***	0.54***	0.98***
		(0.009)	(0.009)	(0.008)	(0.008)	(0.012)
13	Log GDP exporter	0.86***	0.86***	0.73***	0.73***	0.82***
		(0.013)	(0.013)	(0.008)	(0.008)	(0.009)
	Observations	267,987	267,987	273,132	273,132	373,339
	R-squared	0.447	0.444	0.691	0.695	0.715
	Pseudo log-likelihood	-4.71E+12	-4.68E+12	-5.16E+12	-5.06E+12	-4.70E+13
	Hypothesis Testing					
H1	**5=7=9**					
	chi.sq		589.25		515.92	631.18
	prob>chi.sq		0		0	0
H2	**4=6=8**					
	chi.sq		788.11		3034.92	1227.24
	prob>chi.sq		0		0	0
H3	**4=5**					
	chi.sq		387.01		526.39	0.31
	prob>chi.sq		0		0	0.85
H4	**6=7**					
	chi.sq		634.81		1934.53	1478.56
	prob>chi.sq		0		0	0
H5	8=9					
	chi.sq		17.3		766.29	585.22
	prob>chi.sq		0		0	0
H6	**4=5=6=7=8=9**					
	chi.sq		1546.95		3787.43	2248.73
	prob>chi.sq		0		0	0
H7	**6=7=8=9**					
	chi.sq		645.94		2737.42	2216.05
	prob>chi.sq		0		0	0
H8	**4=5=8=9**					
	chi.sq		435.93		1174.39	632.24
	prob>chi.sq		0		0	0
H9	**4=5=6=7**					
	chi.sq		1483.51		3218.53	1624.35
	prob>chi.sq		0		0	0
H10	**10=11**					
	chi.sq	405.51		430.1		
	prob>chi.sq	0		0		

Notes: ***, **, * denote significance at 1%, 5% and 10% level, respectively. The variables log of GDP per capita importer and exporter and log of real exchange rate is included but not reported. All the standard errors reported are robust. In the first two columns, the dependent variable is trade of primary agricultural goods between trading pairs for a given year. In column 3 and 4, the dependent variable is trade of processed agriculture products between country pairs for a given year. In column 5, the dependent variable is trade of non-agricultural goods between country pairs for a given year. The dependent variable is in level in all cases. PPML estimators are used in all cases. All estimations include time and country-pair specific dummies.

Table 2.3: Heterogeneity in Export-Product Composition

		All Recipients	GPT Recipients	LdcGSP Recipients	TGSP Recipients
	VARIABLES	(1)	(2)	(3)	(4)
1	Both importer & exporter in WTO	0.66***	0.66***	0.48***	0.52***
		(0.065)	(0.065)	(0.062)	(0.063)
2	Only importer in WTO	-0.86***	-0.85***	-0.61***	-0.65***
		(0.063)	(0.062)	(0.06)	(0.06)
3	Only exporter in WTO	0.53***	0.54***	0.61***	0.57***
		(0.06)	(0.06)	(0.058)	(0.058)
4	Primary product	-0.64***	-0.61***	-0.46***	-0.47***
		(0.022)	(0.021)	(0.015)	(0.015)
5	GSP recipient exports	0.30***	0.36***	-2.42***	-1.02***
		(0.027)	(0.025)	(0.038)	(0.037)
6	GSP donor exports	-0.20***	-0.16***	-0.57***	-0.40***
		(0.027)	(0.027)	(0.037)	(0.034)
7	Primary * Recipient exports	0.61***	0.55***	2.27***	1.52***
		(0.031)	(0.031)	(0.043)	(0.061)
8	Primary * Donor exports	0.11***	0.10**	-0.76***	0.16
		(0.043)	(0.043)	(0.063)	(0.099)
9	Log GDP of importer	0.51***	0.50***	0.49***	0.50***
		(0.006)	(0.006)	(0.006)	(0.006)
10	Log GDP of exporter	0.78***	0.78***	0.80***	0.80***
		(0.007)	(0.007)	(0.007)	(0.007)
	Observations	541,119	541119	541119	541119
	R-squared	0.597	0.598	0.561	0.563
	Pseudo log-likelihood	-1.03E+13	-1.03E+13	-1.06E+13	-1.06E+13
	Hypothesis Testing				
H1	**4=7=8**				
	chi.sq		1030.04	3325.95	1254.7
	prob>chi.sq		0	0	0
H2	**7=8**				
	chi.sq		329.65	3052.6	619
	prob>chi.sq		0	0	0
H3	**5=6**				
	chi.sq		249.44	4468.35	901
	prob>chi.sq		0	0	0
H4	**5=6=7=8**				
	chi.sq			5116.95	1026.14
	prob>chi.sq		0	0	0

Notes: ***, **, * denote significance at 1%, 5% and 10% level, respectively. The variables log of GDP per capita importer and exporter and log of real exchange rate is included but not reported. All the standard errors reported in parenthesis are robust. The dependent variable is a product level (primary and processed) trade flows between trading pairs for a given year. Fixed Effect PPML estimators are used in all cases. All estimations include time and country-pair specific dummies.

Table 2.4: Robustness Check

	(1)	(2)
VARIABLES	Log one plus flow	Negative Binomial
Primary	-0.62***	-0.34***
	(0.017)	(0.004)
GPT recipient exports	-0.80***	-0.25***
	(0.189)	(0.006)
GPT donor exports	1.51***	0.34***
	(0.389)	(0.008)
Primary *GPT recipient exports	1.82***	0.59***
	(0.03)	(0.007)
Primary*GPT donor exports	-2.78***	-0.63***
	(0.04)	(0.01)
LdcGSP recipient exports	-2.30***	-0.98***
	(0.194)	(0.012)
LdcGSP donor exports	2.55***	0.21***
	(0.218)	(0.016)
Primary *LdcGSP recipient exports	4.64***	1.28***
	(0.045)	(0.013)
Primary *LdcGSP donor exports	-3.73***	-0.64***
	(0.083)	(0.023)
TGSP recipient exports	-0.50***	0.001
	(0.073)	(0.016)
TGSP donor exports	-0.67***	0.31***
	(0.101)	(0.02)
Primary *TGSP recipient exports	0.30***	0.27***
	(0.086)	(0.021)
Primary *TGSP donor exports	-0.48***	-0.21***
	(0.121)	(0.028)
Observations	541,119	539,688
R-squared	0.127	
Pseudo log-Likelihood		
Log-Likelihood		-6073077.7
chi2		294435.97
F stats	1169.78	

Notes: ***, **, * denote significance at 1%, 5% and 10% level, respectively. All the time varying control variables are included but not reported. All the standard errors reported in parenthesis are robust. For column 1, S.E are clustered by country-pairs. The dependent variable is product level trade flows between trading pairs for a given year. For the first column, the dependent variable is in log. All estimations include time and country-pair specific dummies.

Table 2.5: Case Study with European Union's and the US GSP Programs

	(1)	(2)
VARIABLES	EU	US
Primary	-0.51***	-0.50***
	(0.019)	(0.016)
GPT Recipient Exports	0.38***	0.35***
	(0.029)	(0.042)
GPT Donor Exports	-0.10***	0.46***
	(0.026)	(0.051)
LdcGSP Recipient Exports	-1.85***	-2.62***
	(0.045)	(0.124)
LdcGSP Donor Exports	-0.45***	-1.19***
	(0.042)	(0.092)
TGSP Recipient Exports	-1.11***	-1.12***
	(0.047)	(0.072)
TGSP Donor Exports	-0.50***	-0.87***
	(0.043)	(0.067)
Primary* GPT Recipient Exports	0.37***	0.49***
	(0.032)	(0.057)
Primary* GPT Donor Exports	-0.41***	0.51***
	(0.043)	(0.063)
Primary* LdcGSP Recipient Exports	2.21***	1.65***
	(0.048)	(0.157)
Primary* LdcGSP Donor Exports	-1.23***	-0.50***
	(0.077)	(0.155)
Primary* TGSP Recipient Exports	1.15***	1.27***
	(0.066)	(0.119)
Primary* TGSP Donor Exports	-0.74***	0.51***
	(0.07)	(0.119)
Observations	541,119	541,119
R-squared	0.591	0.588
Pseudo log-Likelihood	-1.03E+13	-1.05E+13

Notes: ***, **, * denote significance at 1%, 5% and 10% level, respectively. All the time varying control variables are included but not reported. All the standard errors reported in parenthesis are robust. The dependent variable is product level trade flows between trading pairs for a given year. Fixed Effect PML estimators are used. Time and Country pair dummies are included.

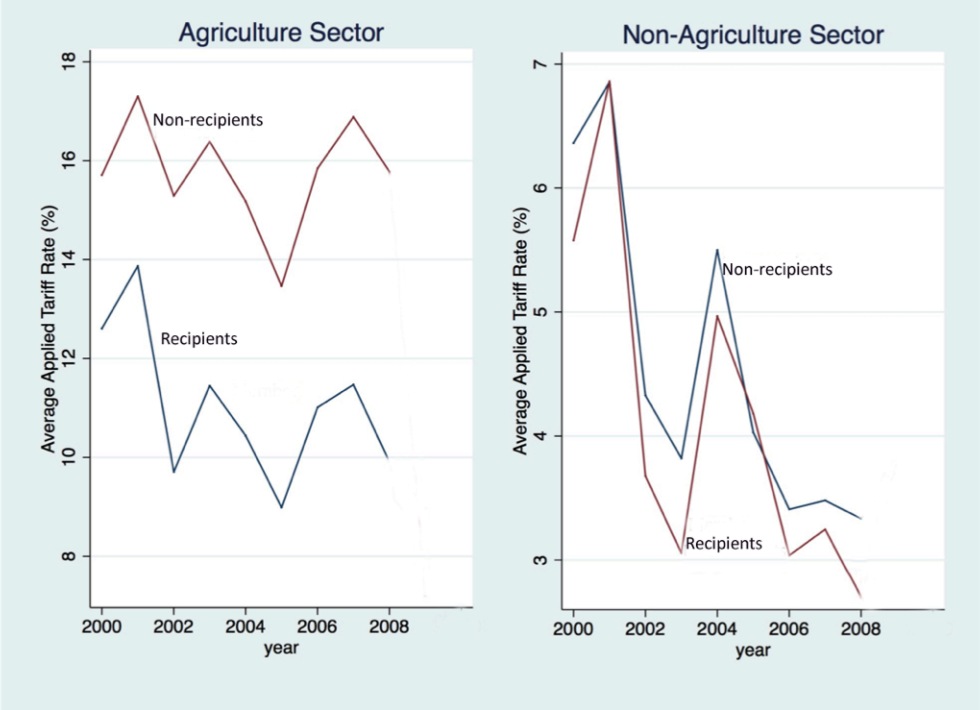

Figure 2.1: Differences in Applied Tariff Rates for Aggregated Agriculture and Non-Agriculture Sectors

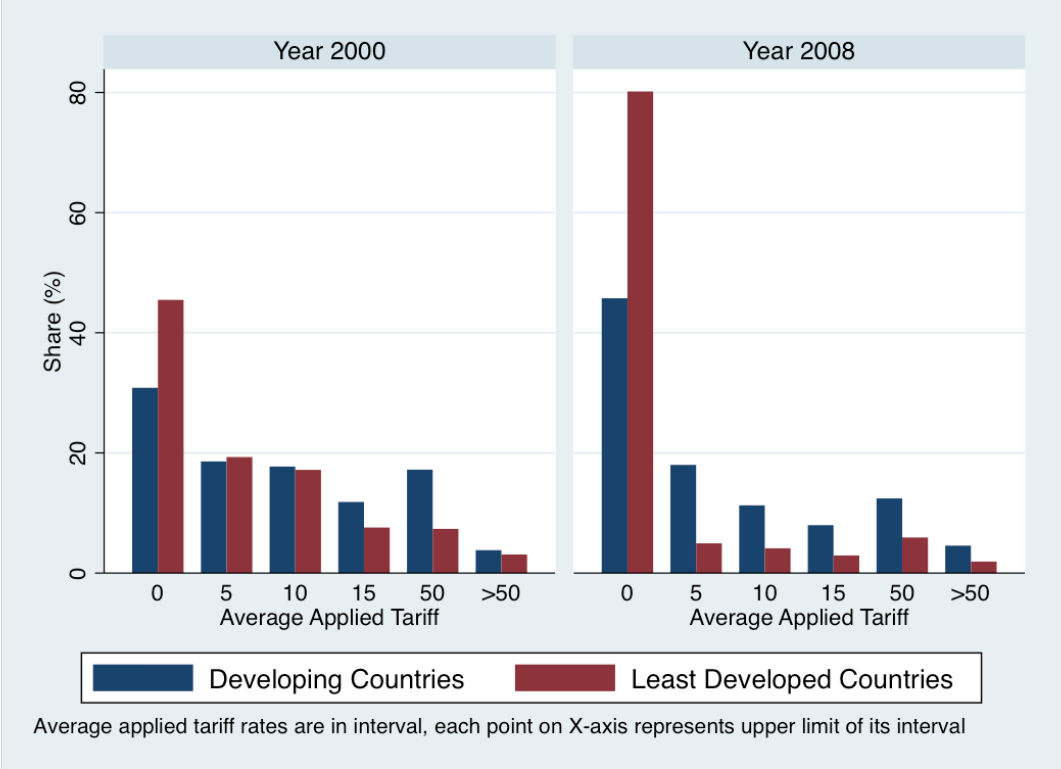

Figure 2.2: Difference in Liberalization across GSP Recipients in Agriculture Sector

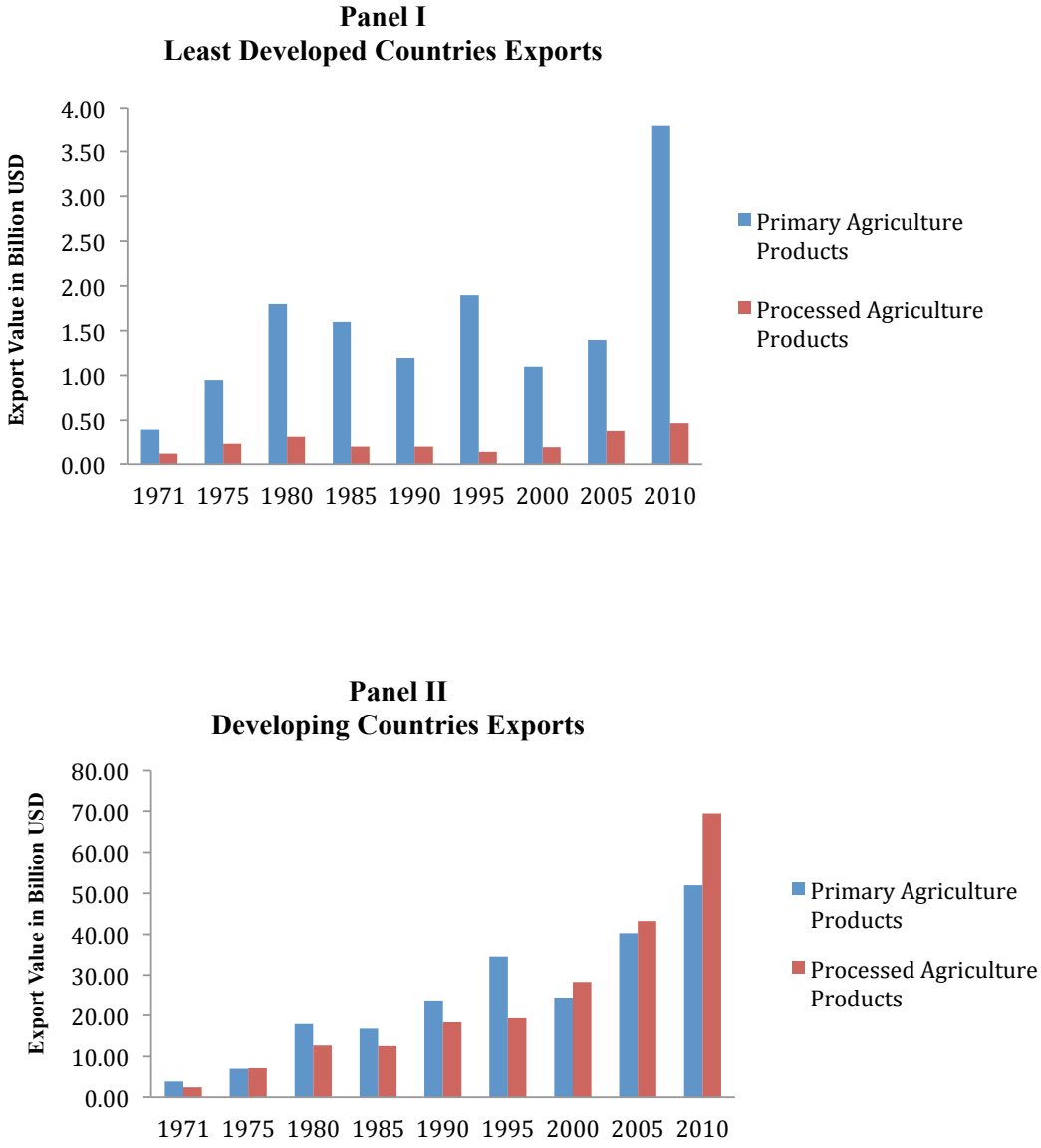

Figure 2.3: Primary and Processed Agricultural Product Exports by Development Status of GSP recipients

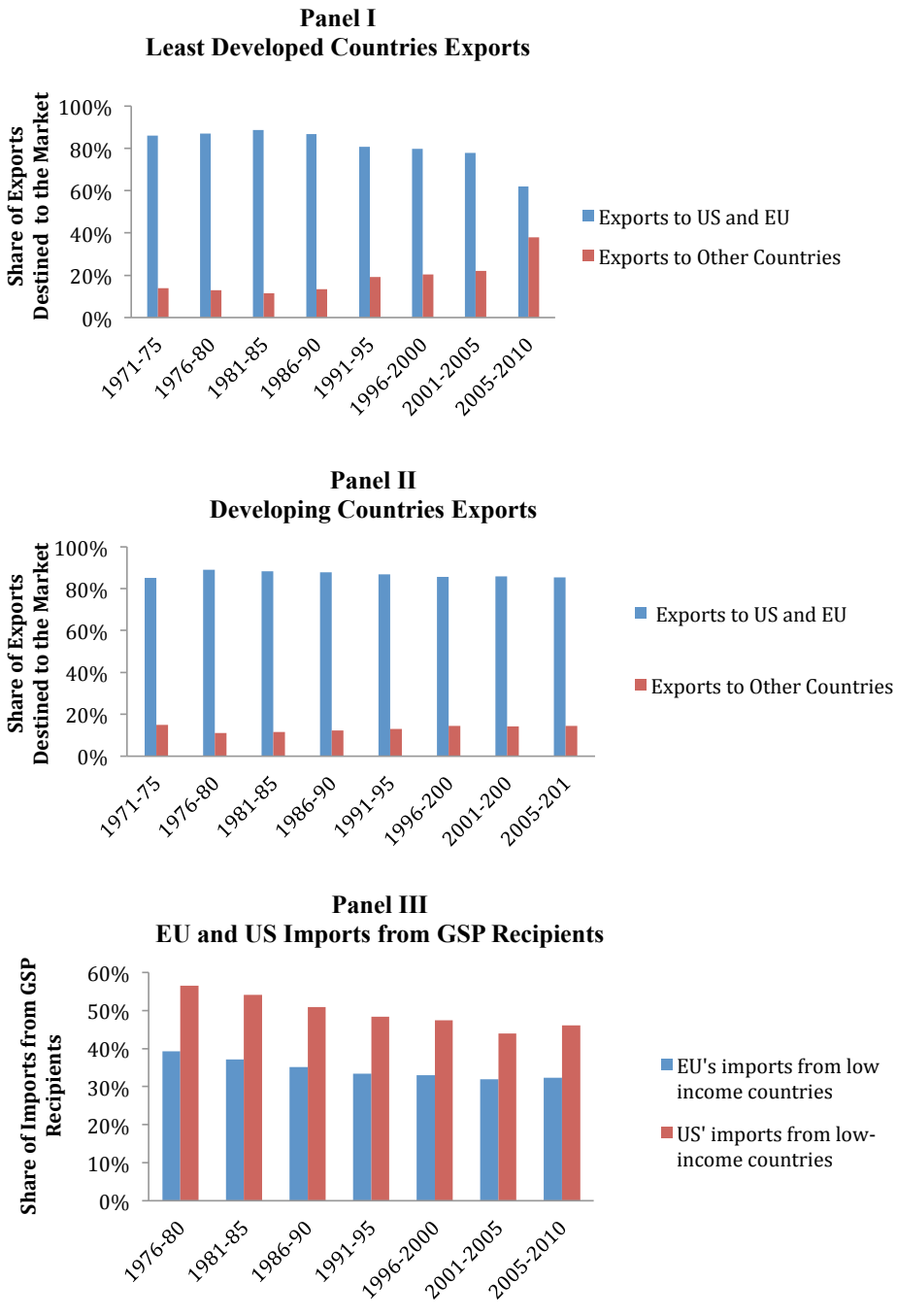

Figure 2.4: Agricultural Export and Import Shares for GSP Countries

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Appendix A

Model

A theoretically founded sectorial gravity equation is used to estimate the GSP effect. In the following, I derive the gravity equation following familiar algebra as in Dixit-Stiglitz monopolistic competition (1977). I start with a simple two-country model and then extend the analysis to include all countries in the world. Following consolidated work with gravity equation, I use separable utility function, solve for consumers demand function, solve for producers labor demand for producing a good, impose market clearing condition, aggregate over goods, extend to multiple countries and finally derive a theory consistent gravity equation

Consumer Side Analysis

Consider a following separable utility function

$$U = u\left(X_0, v(x_1, ..., x_2, ..., x_n, ...)\right) \tag{2.5}$$

where X_0 is the numeraire (all other sectors are aggregated into one and is chosen as numeraire) and $x_1, ..., x_2, ..., x_n, ...$ are differentiated products within a sector. Say, an economy's endowment on this numeraire sector is one. Further, assume that a consumer has a cobb-douglas utility function for inter-sector and a constant elasticity of substitution (CES) for intra-sector trade. Then the utility function, faced by consumers in country j from consuming products exported by country i, takes the following form:

$$U_{ij} = X_{ijo}^{1-\alpha}\left[\left(\int_{i=1}^{N}\int_{0}^{1} x_{ij}(w)^{\rho}\, dw\, di\right)^{\frac{1}{\rho}}\right]^{\alpha} \tag{2.6}$$

$$\text{say, } \left(\int_{i=1}^{N}\int_{0}^{1} x_{ij}(w)^{\rho}\, dw\, di\right)^{\frac{1}{\rho}} = C$$

where $x_{ij}(w)$is the quantity demanded of product w in a sector, j represents importing country, i denotes all countries in the world (allowing for importing from itself), α is the parameter associated with cobb-douglas utility function and ρ is the parameter associated with CES utility function. As can be seen (integral over the interval $[0, 1]$, I assume there are infinite numbers of products in a sector. Then two-stage modeling is applied to solve the utility maximization problem (UMP). The first stage ump is as follows:

$$maxu(X_0, C) \tag{2.7}$$

$$\text{s.t. } X_0 + qC = I$$

where q is the price index for the composite good C, and I is the income. The cobb-douglas utility function is homothetic and the inter-sector share is a constant. The above utility maximization problem will led us to following demand for each sectors:

$$X_0 = (1 - \alpha), C = \frac{\alpha I}{q} \tag{2.8}$$

The second stage maximization problem is then as follows:

$$maxv = \left(\int_{i=1}^{N}\int_{0}^{1} x_{ij}(w)^{\rho}\, dw\, di\right)^{\frac{1}{\rho}} \tag{2.9}$$

$$\text{s.t.}$$
$$\int_{i=1}^{N}\int_{0}^{1} p_{ij}x_{ij}(w)\, dw\, di = \alpha I$$

where $p_{ij}(w)$ is the price faced by a consumer in country j for the product w produced in country i. Considering that the good is traded, it differs from producer's supply price due to trade costs. As in Anderson Van Wincoop (2003), this trade costs is captured by *ad valorem* tax equivalents. Then,

$$p_{ij}(w) = p_i(w)t_{ij}(w) \tag{2.10}$$

where $p_i(w)$ is the producer's supply price and is the ad valorem tax equivalent of trade costs (when a good is exported from country to country). Then familiar algebra

in the above utility maximization problem will lead us to the following demand equation for a good w within a sector:

$$x_{ij}(w) = \left(\frac{(p_i(w)t_{ij}(w)}{q_j}\right)^{\frac{1}{\rho-1}} .\frac{\alpha I}{q_j} \tag{2.11}$$

where q_j is index price for all products in the sector in country j and is as follows:

$$q_j \equiv \left(\int_{i=1}^{N}\int_{0}^{1} (p_i(w)t_{ij}(w))^{\frac{\rho}{(\rho-1)}}\ dw\, di\right)^{\frac{(\rho-1)}{\rho}} \tag{2.12}$$

Aggregate Demand in the Sector

This model allows consumers to diversify their consumption. The number of goods n_i [19] in a sector is determined endogenously in producer side analysis (below). Assuming that a representative consumer demands all goods in the sector symmetrically, aggregate (sectorial) demand is given by:

$$\sum_{w=1}^{n} x_{ij}(w) = X_{ij} \quad = n_i\left(\frac{p_i(w)t_{ij}(w)}{q_j}\right)^{\frac{1}{(\rho-1)}} .\frac{\alpha I}{q_j} \tag{2.13}$$

If a country trades with countries (including itself) and assuming there are n_i number of products in the sector, the sub-utility function in (2) reduces to:

$$C = \left(\sum_{i=1}^{N}\sum_{w=1}^{n} (x_{ij}(w)^{\rho}\right)^{\frac{1}{\rho}} \quad = \left(Nn_i x_{ij}^{\rho}\right)^{\frac{1}{\rho}} \tag{2.14}$$

where x_ij is the quantity demanded of a single good for a country j from country i within the sector. Similarly, the price index in (8) reduces to:

$$q_j \equiv \left(\sum_{i=1}^{N}\sum_{w=1}^{n} (p_i(w)t_{ij}(w))^{\frac{\rho}{(\rho-1)}}\right)^{\frac{(\rho-1)}{\rho}} \quad = N^{\frac{(\rho-1)}{\rho}} {n_i}^{\frac{\rho-1}{\rho}} p_i t_{ij} \tag{2.15}$$

Then expenditure function can be written as:

$$\alpha I \equiv Cq \quad \equiv Nn_i p_i t_{ij} x \tag{2.16}$$

[19] The number of goods appears with subscript to make the derivation consistent with the producer side analysis.

Equilibrium in this model depends upon two factors. First, firms maximize profit consistent with the demand equation in (7). Second, quantities of w , that is $y_i(w)$ adjusts until the marginal firm just breaks even (free entry condition).

Producer Side Analysis

$$l_i(w) = f(w) + c(w).y_i(w) \tag{2.17}$$

where $l_i(w)$ is labor used for producing good w, $y_i(w)$ is a firm's output in volume in country i, $f(w)$ is the associated fixed cost, and $c(w)$ is the associated marginal cost. Assuming that each firm produces a unique product, monopolistic pricing can be applied. Further, assuming a firm's price does not affect price of other firms (there are large number of firms in the market), producer's optimization problem leads to the following:

$$p_i(w) = \frac{c(w)}{\rho} \tag{2.18}$$

Free entry condition implies zero optimal profit. Then, resulting output level is given by:

$$y_i(w) = \frac{f(w)}{c(w)}.\frac{\rho}{(1-\rho)} \tag{2.19}$$

If the total labor endowment in an economy specialized for working in the sector is L_i , then the equilibrium number of goods (firms) within the sector in the country can be computed as follows:

$$n_i = \frac{L_i}{l_i(w)} \quad = \frac{L_i}{f(w) + c(w).y_i(w)} = \frac{Y_i}{r(f(w) + c(w).y_i(w))} \tag{2.20}$$

where Y_i stands for the total value of goods produced in country i in the sector, and r is the associated wage rate. There are number of assumptions in deriving (16): there is only one factor of production (labor), production technology is same for all goods across countries (technological parameters in equation (13) are constant), full employment, and thus all firms are symmetric within the sector (produce same quantity of output, wage rate is same across countries and prices are same too) Substituting the above expression in (16) for demand equation in (9) we get:

$$X_{ij} = \frac{Y_i}{r(f(w) + c(w).y_i(w))} \left(\frac{p_i(w) t_{ij}(w)}{q_j} \right)^{\frac{1}{(\rho-1)}} . \frac{\alpha I}{q_j} \tag{2.21}$$

Market clearing condition in the model implies:

$$y_i(w) = \sum_j x_{ij}(w) \tag{2.22}$$

A relationship between price, wage and marginal cost can be derived from solving firm's zero profit (equilibrium) condition:

$$\pi_i = p_i(w).y_i(w) - \big(f(w) + c(w).y_i(w)\big).r \quad = 0 \tag{2.23}$$

$$\Rightarrow \tfrac{p_i(w)}{r} = c(w) + \tfrac{f(w)}{y_i(w)}$$

Substituting equation (19) in (17) and using the expenditure function αI defined in (12) we get:

$$X_{ij} = \frac{Y_i}{(f(w) + c(w).y_i(w))}.\frac{(f(w) + c(w).y_i(w))}{y_i(w)}.p_i(w)^{\frac{1}{(\rho-1)}-1}.t_{ij}(w)^{\frac{1}{(\rho-1)}}.\frac{Nn_ip_it_{ij}x_{ij}}{q_j^{\frac{1}{(\rho-1)}+1}} \tag{2.24}$$

$$\Rightarrow \tfrac{Y_i}{y_i(w)}.p_i(w)^{\frac{1}{(\rho-1)}-1}.t_{ij}(w)^{\frac{1}{(\rho-1)}}.\frac{Nn_ip_it_{ij}x_{ij}}{q_j^{\frac{1}{(\rho-1)}+1}}$$

From producer side analysis, the elasticity of substitution σ between products in the sector is:

$$\sigma = \frac{1}{1-\rho} \tag{2.25}$$

Gravity Equation

Using elasticity of substitution in (21), expression (20) can be written as a gravity model as follows:

$$X_{ij} = \frac{Y_i}{y_i(w).p_i(w)}.p_i^{-\sigma}.t_{ij}^{-\sigma}.\frac{Nn_ip_it_{ij}x_{ij}}{q_j^{1-\sigma}} \tag{2.26}$$

$$\Rightarrow X_{ij}^s = \frac{output_i^s}{y_i(w).p_i(w)}.p_i^{-\sigma}.t_{ij}^{-\sigma}.\frac{Expenditure_j^s}{q_j^{1-\sigma}} \tag{2.27}$$

where X_{ij}^s is the bilateral trade between country i and country j at the sector level. Note that throughout the derivation, subscript s was suppressed for ease of notation. Due to price symmetry in the sector, one can drop the index w . Then, multiplying both sides by the trade cost term t_{ij} and the price term p_i, the bilateral sectorial trade can be expressed in value terms as:

$$X_{ij}.p_i.t_{ij} = \frac{Y_i^s.E_j^s}{y_i(w).p_i}.\left(\frac{p_i t_{ij}}{q_j}\right)^{1-\sigma} \tag{2.28}$$

where E_J^s is the expenditure of the country j in sector s. Now using the market clearance condition and then replacing for the demand for a product variety from equation (7), the above can be written as:

$$X_{ij}.p_i.t_{ij} = \frac{Y_i^s.E_j^s}{\sum_j \left[\left(\frac{p_i(w)t_{ij}(w)}{q_j}\right)^{\frac{1}{(\rho-1)}}.\frac{\alpha_j I_j}{q_j}\right]}.\left(\frac{p_i t_{ij}}{q_j}\right)^{(1-\sigma)} \tag{2.29}$$

$$X_{ij}.p_i.t_{ij} = \frac{Y_i^s.E_j^s}{\sum_j \frac{t_{ij}^{-\sigma}}{q_j^{1-\sigma}}.\alpha_j I_j}.\left(\frac{t_{ij}}{q_j}\right)^{1-\sigma} = Y_i^s.E_j^s.\left(\frac{t_{ij}}{q_j.\Omega^{\frac{1}{1-\sigma}}}\right)^{1-\sigma} \tag{2.30}$$

$$\text{where, } \Omega = \sum_j \frac{t_{ij}^{-\sigma}}{q_j^{1-\sigma}}.\alpha_j I_j$$

Appendix B

List of Countries in the Dataset

Afghanistan (AFG)
Albania (ALB)
Algeria (DZA)
Andorra (AND)
Angola (AGO)
Antigua and Barbuda (ATG)
Argentina (ARG)
Armenia (ARM)
Aruba (ABW)
*Australia[2,3] (AUS)
*Austria[1] (AUT)
Azerbaijan (AZE)
Bahamas (BHS)
Bahrain (BHR)
Bangladesh (BGD)
Barbados (BRB)
*Belarus[1,2] (BLR)
*Belgium[1,2,3] (BEL)
Belize (BLZ)
Benin (BEN)
Bermuda (BMU)
Bhutan (BTN)
Bolivia (Plurinational State of) (BOL)
Bosnia Herzegovina (BIH)
Botswana (BWA)
Brazil (BRA)
Brunei Darussalam (BRN)
*Bulgaria[1,2,3] (BGR)
Burkina Faso (BFA)
Burundi (BDI)
Cõted'Ivoire (CIV)
Cabo Verde (CPV)
Cambodia (KHM)
Cameroon (CMR)
*Canada[1,2,3] (CAN)
Central African Republic (CAF)
Chad (TCD)
Chile (CHL)
*China[2] (CHN)
China, Hong Kong SAR (HKG)
China, Macao SAR (MAC)
Colombia (COL)
Comoros (COM)
Congo (COG)
Costa Rica (CRI)
*Croatia[1,2,3] (HRV)
*Cyprus 1,2,3 (CYP)
*Czech Republic[1,2,3] (CZE)
Democratic People's Republic of Korea (PRK)
Democratic Republic of the Congo (COD)
*Denmark[1,2,3] (DNK)
Djibouti (DJI)
Dominica (DMA)
Dominican Republic (DOM)
Ecuador (ECU)
Egypt (EGY)
El Salvador (SLV)
Equatorial Guinea (GNQ)
Eritrea (ERI)
*Estonia[1,2,3] (EST)
Ethiopia (ETH)
Fiji (FJI)
*Finland[1,2,3] (FIN)
Sudan (SDN)
*France[1,2,3] (FRA)
Gabon (GAB)
Gambia (GMB)
Georgia (GEO)
*Germany[1,2,3] (DEU)
Ghana (GHA)
*Greece[1,2,3] (GRC)
Grenada (GRD)
Guatemala (GTM)
Guinea (GIN)
Guinea-Bissau (GNB)
Guyana (GUY)
Haiti (HTI)
Honduras (HND)
*Hungary[1,2] (HUN)
*Iceland[1,2,3] (ISL)
*India[2] (IND)
Indonesia (IDN)
Iran (IRN)
Iraq (IRQ)
*Ireland[1,2,3] (IRL)
Israel (ISR)
*Italy[1,2,3] (ITA)
Jamaica (JAM)
*Japan[1,2] (JPN)
Jordan (JOR)
*Kazakhstan[1,2] (KAZ)
Kenya (KEN)
Kiribati (KIR)
Kuwait (KWT)
Kyrgyzstan (KGZ)
Lao People's Democratic Republic (LAO)
*Latvia[1,2,3] (LVA)
Lebanon (LBN)
Lesotho (LSO)
Liberia (LBR)
Libya (LBY)
*Lithuania[1,2,3] (LTU)
*Luxembourg[1,2,3] (LUX)
Macedonia (MKD)
Madagascar (MDG)
Malawi (MWI)
Malaysia (MYS)
Maldives (MDV)
Mali (MLI)
*Malta[1,2,3] (MLC)
Mauritania (MRT)
Mauritius (MUS)
Mexico (MEX)
Mongolia (MNG)
*Morocco[2] (MAR)
Mozambique (MOZ)
Myanmar (MMR)
Nepal (NPL)
*Netherlands[1,2] (NLD)
New Caledonia (NCL)
*New Zealand[1,2,3] (NZL)
Nicaragua (NIC)
Niger (NER)
Nigeria (NGA)
*Norway[1,2] (NOR)
Oman (OMN)
Pakistan (PAK)
Palau (PLW)
Panama(PAN)
Papua New Guinea (PNG)
Paraguay (PRY)
Peru (PER)
Philippines (PHL)
*Poland[1,2,3] (POL)
*Portugal[1,2,3] (PRT)
Qatar (QAT)
*Republic of Korea[2] (KOR)
Republic of Moldova (MDA)
*Romania[1,2,3] (ROM)
*Russia[1,2] (RUS)
Rwanda (RWA)
Saint Kitts and Nevis (KNA)
Saint Lucia (LCA)
Saint Vincent and the Grenadines (VCT)
Samoa (WSM)
Sao Tome and Principe (STP)
Saudi Arabia (SAU)
Senegal (SEN)
Serbia and Montenegro (SCG)
Seychelles (SYC)
Sierra Leone (SLE)
Singapore (SGP)
*Slovakia[1,2,3] (SVK)
*Slovenia[1,2,3] (SVN)
Solomon Isds (SLB)
South Africa (ZAF)
*Spain[141] (ESP)
Sri Lanka (LKA)
Suriname (SUR)
Swaziland (SWZ)
*Sweden[1,2,3] (SWE)
*Switzerland[1,2] (CHE)
Syria (SYR)
Tajikistan (TJK)
Thailand (THA)
Togo (TGO)
Tonga (TON)
Trinidad and Tobago (TTO)
Tunisia (TUN)
*Turkey[1,2,3] (TUR)
Turkmenistan (TKM)
Uganda (UGA)
Ukraine (UKR)
United Arab Emirates (ARE)
*United Kingdom[1,2,3] (GBR)
United Rep. of Tanzania (TZA)
Uruguay (URY)
*USA[1,2,3] (USA)
Uzbekistan (UZB)
Vanuatu (VUT)
Venezuela (VEN)
Viet Nam (VNM)
Yemen (YEM)
Zambia (ZMB)
Zimbabwe (ZWE)

Notes: ISO codes are provided in paranthesis.
* Indicates GSP Providers
1=GSP provided to developing countries
2=GSP provided to least developed countries
3=GSP provided to other countries

Chapter 3

Truly Preferential Treatment? Reconsidering the Generalized System of (Trade) Preferences

ABSTRACT

Empirical research on preferential treatment for developing economies have not considered how preferential margins might influence market access particularly when competing non-members might be receiving preferential benefit of their own with a common trade partner. In this paper, I develop two indices to measure bilateral trade restrictions by considering product line tariffs and the product line market participants. One index captures the restrictions bilateral tariff rates impose on market access conditions of a country as compared to the most favored nation rate, called the Exponential Trade Restrictiveness Index (ETRI). The other index captures the relative ease with which a country can access foreign markets compared to its competing suppliers, called the Exponential Relative Preferential Margin (ERPM). Then, I use these two bilateral indices and develop a model of sector-based bilateral trade to re-evaluate the Generalized System of Preferences (GSP) in terms of relative market access preferences. The results show that the GSP has increased relative market accessibility for low-income countries and in turn boosted exports from these countries by 26 to 28 percent.

Keywords: *Relative Preferential Margin, Trade Restrictiveness Index, GSP*

3.1 Introduction

For more than fifty years, starting from 1948, the World Trade Organization (WTO) and its predecessor the General Agreements on Tariffs and Trade (GATT) have been cornerstones for multilateral trade and were generally accepted as engines to propel export-lead growth. Over the turn of the century though, countries increasingly trade in bilateral and regional trade agreements-an exception to non-discrimination allowed by WTO members under Article XXIV. Trade economists and policy makers alike view these preferential trade agreements (PTAs) as specialized mechanisms tailored to provide market access to partner countries. Often, PTAs provide significant tariff reductions compared to those negotiated through the multilateral process of the WTO, and also enforce complex rules of origin (RoO), which make it costly for non-member countries to trade outside of PTAs (Egger and Larch 2008, Hoekman and Nicita 2011, Baldwin and Jaimovich 2012, Fugazza and Nicita 2013). This has lead to a marked increase in the way PTAs are shaping global trade: either countries join existing PTAs or form new PTAs of their own. As of December 2015, the WTO notifications show that there are 265 PTAs in operation.

The proliferation of PTAs has resulted in an important policy question: what is the true preferential margin a developing country enjoys? The traditional metric to measure the extent of preferential margins is to compare the tariff rate offered to a recipient country relative to the multilateral (i.e., most favored nation (MFN)) rate agreed to under the World Trade Organization (WTO). While this may still be important for some products and markets, the explosion of PTAs over the last two decades means that relative preferences matter because competing suppliers, including developed countries, likely enjoy some preferential treatment of their own in a given import market (Francois et al. 2006, Inama 2006, Fugazza and Nicita 2013). Intuitively, the preferential treatment under a PTA may not be as rewarding as intended because other countries capable of exporting similar or highly substitutable products may enjoy a preferential program of their own. Thus, preference erosion, when measured relative to competing suppliers, likely has important implications for the trade-facilitating impacts of the GSP for developing economies.

Viner (1950) opened the discussion about the effects of PTAs (custom unions) on

international trade claiming membership in trade-diverting custom unions shifted the "locus" of imports and thus production from non-member countries to a high-cost member country. This finding, which countered the intended goal of regional trade led export growth, was later re-evaluated in partial and general equilibrium settings by Lipsey (1957) and Bhagwati (1971). These later theoretical studies agree that even trade-diverting custom unions could be welfare enhancing when the model accounts for substitutability among different varieties or more generally when the level of imports is fixed as production varies. Follow-up studies, of which there are many, also take a theoretical approach in evaluating the effects of PTAs for members and non-members (see for e.g., Kemp and Wan 1976, Grossman 1995, Krishna 1998, Ornelas 2005).

More recently, an increasing number of studies measure the extent to which preferential treatment impacts recipients' trading volumes. While many theoretical studies predicted large and positive effects of PTAs, empirical research has produced mixed evidence, especially in the case of Generalized System of Trade Preferences (see for e.g., Rose 2004, Hoekman and Ozden 2005, Gamberoni 2007, Limão 2007, Subramanian and Wei 2007, Herz and Wagner 2011). Initially, due in part to the product-specific eligibility for preferential treatment under GSP, program administration was complicated for recipient nations. Further, eligible products were frequently not produced or not significant sectors for the recipient nations and many of these studies use total merchandise trade statistics that may mask important preferential benefits in some product lines. Second, rarely have studies considered the preferential tariff margin a developing country enjoys relative to the tariff level of its competing suppliers.

For example, Herz and Wagner (2011) cast considerable doubt on the benefits of GSP by using dummy variables in a gravity-based framework applied to total merchandise trade and found a negative effect on trade both in the short and the long run. Other assessments of the GSP program have focused on program utilization rate (Carpenter and Lendle 2010) and compliance cost (MacPhee and Rosenbaum 1989, Devault 1996, Grossman and Sykes 2005, Reynolds 2005). Similar to Herz and Wagner (2011), in these studies consideration of GSP is simplified in that all products from a participating country are assumed to benefit from the GSP rather than the relatively smaller subset of product lines actually eligible for preferential treatment. An exception to this is a working paper by Cirera et al. (2011), which includes product line considerations in evaluating a single donor's GSP program (EU)

over a limited time period (6 years; 2002-2008) by comparing the preferential rate offered to low-income countries to the EU's MFN rate. However, in this study, the authors report that the GSP offers only a limited trade creation benefit.

The above research, however, does not consider how GSP membership might influence market accessibility when competing non-member suppliers might be receiving preferential treatment of their own in a common import market. With this in mind, the purpose of this paper is twofold. First, to develop two theoretically consistent indices called the Exponential Trade Restrictiveness Index (ETRI) and the Exponential Relative Preferential Margin (ERPM) to measure the margin of tariff preferences a country receives in exporting its products to import markets offering regional trade preferences inclusive of GSP programs. Second, to use these two bilateral indices alongside the GSP indicator variable to develop a gravity-based framework to re-evaluate the performance of the GSP while considering the preferential margins of competing suppliers.

The above two indices are based on the theoretical foundation provided in Anderson and Neary (1996, 2003). Both indices are modified as an exponential form, which is by design, because this function assigns greater weight (i.e., penalty) to larger preferential differences. The ETRI captures the restrictions bilateral tariff rates impose on market access as compared to the most favored nation rate while the ERPM captures the relative ease with which a country can access foreign markets compared to its competing suppliers.

In terms of contribution, while this paper is not the first to conceptualize the direct and relative trade restrictiveness indices, the indices constructed in this paper are novel, theoretically consistent, and also identify the detrimental protectionist policies better and penalize them more. This later aspect is particularly relevant in case of less developed countries as they typically have a smaller export basket. It is not uncommon for less developed countries to specialize in production and exports of as few as one to five products. If these suppliers face very high tariff rates in these exportable products while being eligible for generous tariff preferences in all other products for which specialization is limited,on the surface the GSP preferences may overstate an otherwise protectionist tariff program enforced on exportable goods.[1]

[1]Existing methods to measure trade restriction use simple or weighted average of tariff rates, which might not detect protectionist policies present in a few sectors. This can be particularly

Thus, these indices are designed primarily to address this potential mismatch in product eligibility.

Further, theoretical advances in the specification of the gravity equation - the workhorse model in the empirical trade literature - includes two multilateral resistance (i.e., price) terms. Theoretically, one measures the bilateral trade cost that is inclusive of tariff and non-tariff barriers while the other measures any resistance an exporter faces from the outside world in bilateral exports. As will be discussed, however, the problem is that these two multilateral price terms are not directly observable to the econometrician. Moreover, in a longer panel, these multilateral price terms are likely time-varying as trade preferences adjust through time and/or countries unilaterally take on liberalization efforts. In a panel data setting, the standard practice is to use various panel effects such as country-by-time dummies to account for these terms. While the dummy variable approach has been shown to adequately control for multilateral resistance, more explicit measures of relative tariff margins compared to competing suppliers in the rest of the world might offer new insights into the factors explaining multilateral resistance especially in the context of the increasing number of preferential trade agreements. As such, the two indices constructed in this paper offer time-varying country-pair specific measures of relative tariff costs that are closely tied to the general equilibrium structure of the gravity equation developed by Anderson and Van Wincoop (2003) and further expanded on by Baldwin and Taglioni (2006).[2]

Finally, low-income GSP receiving countries specialize in production and trade of agricultural goods. In fact, research has shown differences in the GSP effect across sectors (see for example, Gamberoni 2007, Subramanian and Wei 2007, Grant and Boys 2012). Therefore, these indices are computed for agricultural and non-agricultural goods separately and for 15 different sectors within the former. This allows us to compare the possibly differential impacts countries have on these sectors in terms of market accessibility conditions.

The remainder of this paper is organized as follows. The next section describes the preferential margins and market accessibility conditions. Section 3.3 summarizes the

detrimental if these policies overlap with the few export items the low-income country is capable of exporting.

[2]However, specifically designed to measure the tariff preferential margins, these indices developed here take into account only the tariff-related trade costs of multilateral resistance terms.

empirical estimation of the indices. Section 3.4 discusses first-pass gravity and fit of ETRI and ERPM in the model. Section 3.5 illustrates the empirical model and estimation of the GSP effect on trade. Section 3.6 discusses the data used in this research. Section 3.7 provides empirical results and discussion. Finally, section 3.8 offers summary and concluding remarks.

3.2 Preferential Margins and Market Accessibility

The principle of most favored nation treatment does not allow discrimination amongst partner countries in trade of similar goods. However, countries may form free trade agreements, custom unions or regional trade agreements under GATT Article XXIV or they may offer preferences to lower income countries such as the GSP under the enabling clause of "special and differential treatment".[3] Therefore, a country might offer differential tariff preferences on similar goods to its different trade partners depending upon the type of trade agreements that are in place. By way of example, for fresh cut flowers and buds, Canada enforces at least five different levels of tariff rates to its trade partners in the year 2000 by offering duty free treatment to New Zealand, a preferential tariff rate of 1.8 percent to Israel (under the CAN-ISR free trade agreement), four percent to Chile (under the CAN-CHL free trade agreement), five percent to Mexico (under NAFTA) and 5.8 percent to Kenya (under the GSP). While Canada has bilateral free trade agreements (FTAs) with these other countries, it offers GSP preferences to Kenya. In this real world example, all countries receive tariff preferences into the Canadian cut flower import market despite the fact that the GSP rate is higher than each of Canada's FTA tariffs.

The fact that countries face different tariff rates in the same destination market has important implications on the *relative* competitiveness and ability of countries to access international markets. As another example, consider the case of South Africa which is a major producer of sunflower oil and is considering the European market for its exports. In the Romanian market, South Africa receives a GSP preferential tariff rate of 6.7 percent. South Africa's production efficiency coupled with the preferential tariff for this product might enable it to be price competitive with domestic

[3]GATT enacted two waivers to the MFN that permitted formation of GSP in 1971. But these waivers were limited to ten years and later in 1979 GATT established a permanent exemption to the MFN obligation by way of the enabling clause.

producers in Romania. Can it be concluded that South Africa has a high level of market access to the Romanian sunflower oil market? What if competing suppliers receive preferential tariff benefits from Romania sufficiently generous that, in practice, South Africa cannot compete against imports from these suppliers? In fact, in this example it turns out that Bulgaria and Moldova are also competitive suppliers to the European market and enjoy duty free access under the European free trade agreement, occupying market shares of 12.1 and 10.9 percent, respectively. Thus, an important policy question remains: are European Union and other developed countries' pursuance of bilateral and regional free trade agreements eroding the preferences of GSP beneficiaries like South Africa?

These types of questions are economically important for lower-income countries and can be explored using the proposed indices developed in this paper. More specifically, the ETRI will shed light on the overall restrictiveness (openness) of bilateral tariff structures relative to the MFN tariff in a given import market. Then, the ERPM will permit us to gauge the relative tariff preferences of exporting country as compared to their competing country suppliers who may also be exporting products under a free trade program of their own.

The following three sections describe the existing and alternative ways to measure market accessibility conditions. The first section summarizes the traditional method to measure trade restrictions and relative preferences and their limitations. The second section lays out the theoretical background for development of a set of alternative indices, and describes the Exponential Trade Restrictiveness Index. Finally, the third section summarizes what I view as the more important Exponential Relative Preferential Margin.

3.2.1 Existing Method of Measuring Trade Restrictions and Preferential Margins

The simplest method to compare trade restrictiveness between two policies is to measure and compare the height of the tariff itself. Often in this case, international trade policies are compared using arithmetic or trade weighted averages (τ^A). While using arithmetic average has an obvious downside in that this method does not discriminate between any varieties, using trade volumes as weights assigns different

economic importance to varieties from different countries as follows:

$$\tau^A = \frac{\sum m_i t_i}{\sum m_i \pi_i^*} = \sum w_i \tau_i \tag{3.1}$$

where $w_i \equiv (\frac{m_i \pi_*}{\sum m_i \pi_i^*})$, t_i is the specific tariff rate on good i, m_i is the good $i's$ imports in volume, τ_i is the ad valorem tariff rate on good i, and π_i^* is good $i's$ world price. This trade weighted average method has a more serious problem, however (Anderson and Neary 2003, Kee et al. 2009). For example, when the tariff on a good increases, its demand and thus its imports are likely to decrease resulting in a lower trade weight on average. Moreover, for highly elastic goods and assuming the law of demand holds, as the price increases quantity demanded falls at a higher rate. If the tariff is already high the fall in quantity demanded will decrease the trade weights to an extent that the restrictiveness index may appear to decrease when tariffs are actually increasing. Thus, a more valid averaging procedure is required to address this problem and can be obtained from balance of trade function.

The first explicit behavioral model using balance of trade function to measure the trade restrictiveness index (TRI) was proposed by Anderson and Neary in 1996. Anderson and Neary's TRI is the uniform tariff applied to imports instead of the current protection structure which maintains the welfare level in the home (importing) country at the original level (Anderson and Neary, 1996). They applied the TRI to measure the restrictiveness of US "voluntary export restraints" on exports of textiles and apparel from Hong Kong.[4] While this is a partial equilibrium application of the TRI, they also construct a computable general equilibrium model that is applied to measure the change in restrictiveness of Colombian trade policy between 1989 and 1990. While this index theoretically captures the welfare effect in the home country and is empirically operationalized, it does not answer the effect of trade restriction from an exporters' perspective. A more relevant index to measure the impact of trade protection would be to find a uniform tariff that if imposed on home imports instead of the existing structure of protection would leave aggregate imports at the original level. This later index is Anderson and Neary's (2003) Mercantilist Trade Restrictiveness Index (MTRI). Feenstra (1995) shows that holding world prices constant, the TRI is simply the weighted average of the squared values of individual tariffs. Further, these weights increase with import demand elasticities

[4]Under the Multi-Fiber Arrangement Hong Kong exports of textiles and apparel to the U.S. were subject to binding export quotas

at the tariff line. The sound theoretical foundation of MTRI and partial equilibrium simplification of TRI made empirical estimation of the trade restrictiveness indices feasible. Kee et al. (2009) computed three different versions of Anderson and Neary's TRI, one called the Overall Trade Restrictiveness Index (OTRI) to focus on the trade restrictions from an exporter's perspective. Fugazza and Nicita (2013) adopt a slightly different version in their empirical estimation and call it the Tariff Trade Restrictiveness Index (TTRI). The TTRI differs from the OTRI in that the former does not include non-tariff barriers such as quota constraints. As mentioned earlier, both the OTRI and the TTRI are partial equilibrium simplifications of the original Anderson and Neary's MTRI. Implicit in this simplification and unlike in computable general equilibrium (CGE) models, only the direct impact of tariffs are captured, thus abstracting away from any income or cross-price substitution effects. The TTRI/OTRI faced by country i in exporting to country j is as follows:

$$TTRI_{ij} = \frac{\sum_{hs} X_{ij,hs}.\epsilon_{j,hs}.T_{ij,hs}}{\sum_{hs} X_{ij,hs}.\epsilon_{j,hs}} \tag{3.2}$$

where $X_{ij,hs}$ are exports, ϵ is the import demand elasticity, T is the applied tariff, and hs is the product denoted at the Hs-6 digit level; subscripts for time are suppressed here for ease of notation. The major contribution of the above index is that it is empirically tractable and could be adopted for a large number of countries.

One of the more important problems with preferential margin/trade restriction relative to the MFN rate is that they overstate the benefit of preferential tariffs because of the large network of regional preferences other countries likely enjoy. In fact as Bhagwati (2008) notes, countries that face the MFN rate are more likely to be the "least favored nation". As argued in the previous section, the actual extent of 'preference' a country experiences depends, in part, upon the extent of preferences available to its competitors in the same destination market. A preferentially treated exporter might not benefit from the trade agreement, if competing suppliers receive even lower or duty free treatment in the same market. Fugazza and Nicita (2013) were the first to formalize this concept of RPM, which is given as follows:

$$RPM_{ij} = \frac{\sum_{hs} X_{vj,hs}.\epsilon_{j,hs}.(T^{w}_{j,hs} - T_{ij,hs})}{\sum_{hs} X_{vj,hs}}, i \neq j \tag{3.3}$$

$$T^{w}_{j,hs} = \frac{\sum_v X_{vj,hs}.T^{v}_{j,hs}}{\sum_v X_{vj,hs}}, v \neq i \tag{3.4}$$

where, v denotes potential competing exporters with country i to destination country j, $T^{w}_{j,hs}$ is trade weighted average tariff applied to imports from each country v, and other notations are as above. Here v is a subset of w not including i. While this margin provides a formal method to measure preferential margin compared to potential competing suppliers, this measure is not without limitations as discussed further below.

3.2.2 Alternative Method of Measuring Trade Restrictiveness Index

Before engaging into the functional form of the alternative set of indices, I provide a brief discussion of the theoretical foundations following Anderson and Neary's (2003) MTRI. Then I discuss how these alternative measures are consistent with this theory and what are the advantages of estimating the indices in exponential form.

Consider an economy with a single representative consumer. Let's assume the economy is in competitive equilibrium and the only form of distortion it experiences is a tariff. Further, assume that the price of the traded goods is fixed in the world market. Then, such an economy can be described by a trade expenditure function $E(\pi, u)$, which equals the excess of household expenditure over production. In this case, the household expenditure is represented by an expenditure function and production by a GNP function. Thus the trade expenditure function is the expenditure needed to attain a utility level u while facing the price vector π (inclusive of tariffs) of traded goods.

$$E(\pi, u) = e(\pi, u) - g(\pi) \tag{3.5}$$

Note that the level of factor endowments, prices of non-traded goods and factors and prices of traded goods not subject to tariff are held constant. Further, the economy's technology and factor endowments are subsumed into the GNP function.[5] Also, the trade expenditure function has all the standard properties of an expenditure function, that is, it is concave in prices. Therefore, Shephard's and Hotelling's Lemma

[5] Dixit and Norman (1980) and Neary and Schweinberger (1980) provide a more detailed treatment of these functions.

can be used to derive the economy's utility- compensated (Hicksian) import demand function $m^c(\pi, u)$

$$E_\pi(\pi, u) = m^c(\pi, u) \tag{3.6}$$

The trade expenditure function summarizes the behavior of the household sector. However, in the presence of tariff distortions, we need to introduce the benevolent government who collects and redistributes the tariff revenue to the representative consumer in a lump sum manner. The balance of trade function $B(\pi, u)$ then describes the outcome of such an economy as follows.

$$B(\pi, u) \equiv E(\pi, u) - (\pi - \pi^*).E_\pi(\pi, u) \tag{3.7}$$

In the above balance of trade function, $(\pi - \pi^*) = T$ is a vector representing the tariff wedge between domestic and world prices. The economy is said to be in equilibrium when the balance of trade constraint is satisfied, that is, utility is such that it equalizes the balance of trade function to any exogenous income, denoted as b

$$B(\pi, u) = b \tag{3.8}$$

Our goal is to evaluate the restrictiveness of trade policy using trade volumes, $M(\pi, b)$ as the reference standard.

$$M(\pi, b) = \pi^*.E_\pi(\pi, u) \tag{3.9}$$

Further, the level of u has to be compatible with the balanced trade in (3.8). Then, MTRI, denoted by τ^μ is the uniform tariff that yields the same volume of tariff-restricted imports as at the initial tariffs, M^0

$$\tau^\mu \equiv [\tau^\mu : B(1 + \tau^\mu)\pi^*, b^0] = M^0 \tag{3.10}$$

In order to determine the index one would need to solve for τ^μ from (3.10) with a computable general equilibrium model. Abstracting away from general to partial equilibrium, however, one can differentiate the above index with respect to uniform tariff τ^μ and individual tariffs T_i which would result in the marginal deadweight loss of the tariff. Further, assuming that the import demand functions are well behaved, integration over all the individual tariff rates would give the desired trade restrictiveness index.

For expositional purposes, assuming linear demand curves would give rise to the trade restrictiveness index similar to the form specified in (3.2).[6] An immediate problem of the above specification, however, is that it considers two countries equally trade restricted if they face similar average trade weighted tariff rates, ceteris paribus. For example, a country may enforce relatively low tariff rates for all goods except one, which is set perniciously high. A TRI specification such as that in equation 3.1 masks this outlier which in practice might be quite detrimental to a developing country's exporting ability. Therefore, a variant of this index that penalizes tariff rates that are more distant from the standard MFN rate is proposed.

While the proposed index is a partial equilibrium simplification of the above theoretical model, unlike the CGE approach it does not necessitate aggregation across industries. An important advantage is that this approach allows comparison of trade restrictiveness at more disaggregated level trade data (product or sector level). The proposed alternative measure of trade restrictiveness index, called the ETRI, which measures the exponential trade restrictiveness index country i faces in exporting to country j as follows:

$$ETRI_{ij} = \frac{1}{K}\left(\sum_{hs} exp(\frac{mfn_{j,hs} - T_{ij,hs}}{mfn_{j,hs}}).weights_{ij,hs}\right) \tag{3.11}$$

$$weights_{ij,hs} = \frac{X_{ij,hs}.\epsilon_{j,hs}}{\sum_{hs} X_{ij,hs}.\epsilon_{j,hs}} \tag{3.12}$$

where exp is an exponential function, K is the total number of products country i exports to country j, and mfn is the WTO's most favored nation (MFN) rate and ϵ is the import demand elasticity. Other notations are as above. Consistent with the theory, the index addresses two major aggregation problems. The first problem is associated with aggregation of tariffs over multiple goods and is addressed with the use of import shares. This is important because the effect of a tariff is expected to be more important on economically important goods or goods that are traded in higher volume. The second problem is associated with the differential dead weight loss due to differential impact of tariffs on goods and is addressed by including import demand elasticities estimated by Kee et al. (2008). This is important because if a good is inelastic then even a large difference in MFN rate and the applied tariff

[6] Similar but not identical in the sense that it precisely leads to weighted average of the squared values of the individual tariffs and not in the level as in 3.1

rate may not produce a large dead weight loss.

More importantly, measuring trade restrictiveness index in exponential form offers the advantage that the trade restriction as measured by the index is both non-linear and non-decreasing as the tariff rate increases. More precisely, if the two tariff rates are similar, but one of them is prohibitively high compared to the MFN rate, then the ETRI penalizes this later tariff rate more because the use of the exponential function ensures that the ETRI score is smaller which means the restriction is higher. This property is very relevant in case of low-income countries because typically their export basket is of smaller size. As mentioned above, it is not uncommon for these countries to concentrate exports in as few as five products. For example, in 2008 Bangladesh exported just five products to destination market Austria. Further, 26 (27) low and lower-middle income countries in our sample exported less than ten ($\leq$ 20) products in the year 2008. Further, country pairs differ in number of products they trade with each other. By scaling the index with the number of traded products, the index score is invariant to trade intensity (meaning the index does not vary too quickly with the number of goods traded by the country pairs). While this would not be an issue when comparing policies at the product level, this is an important consideration when trade policies are compared at the country level. More specifically, in absence of such a scaling factor, bilateral trading pairs that trade a large number of products might show a lower restrictiveness score, ceteris paribus.

Another interesting property of the exponential function is that it has clear upper and lower bound, which in this application, facilitates multiple comparisons across bilateral trading pairs. The specification limits ETRI scores to the interval of $[0, e \sim 2.72]$. A score of one would indicate that the tariff structure the importer enforces is not different from MFN rates. A score of below (above) one means the country faces relatively higher (lower) restrictions in a given market than it would face under the WTO regime. As the tariff vector approaches infinity, the discrepancy between the MFN rate and the tariff rate approaches negative infinity and the score is zero. The other interesting properties of the exponential function and its relevance in the current context will be discussed in the section below.

3.2.3 Alternative Method of Measuring Relative Preferential Margin (RPM)

The specification of RPM in 3.3 retains all the problems discussed above in the case of the TRI. In addition, the trade-weighted average tariff applied to imports from all other countries ($T^{w}_{j,hs}$) would be upwardly biased if there were more countries trading the same product with the partner j, which in turn would under estimate the relative preferential margin for exporter i in the import market j. Equally likely is the fact that the relative preferential margin is upper bound because if a country traded more goods with the partner j then the RPM score as measured above would increase. These are the limitations associated with the functional form of a relative preferential margin index. The proposed ERPM is the exponential relative preferential margin country i enjoys relative to its competing suppliers in exporting to country j:

$$ERPM_{ij} = \frac{1}{K}\left(\sum_{hs} exp(\frac{T^{w\_i}_{j,hs} - T_{ij,hs}}{T^{w\_i}_{j,hs}}).weights_{ij,hs}\right), i \neq j \tag{3.13}$$

$$T^{w\_i}_{j,hs} = \frac{1}{N}\frac{\sum_{\eta \in v} X_{vj,hs}.T^{v}_{j,hs}}{\sum_{\eta \in v} X_{vj,hs}}, v \neq i^{7} \tag{3.14}$$

where, N is the number of actual suppliers of the product to the country j, η is the actual market participants which is a subset of potential competing suppliers v and all other notations are as previously described. Scaling the trade weighted average tariff of all other countries $T^{w\_i}_{j,hs}$ by the number of suppliers removes the upper bias in estimating this weighted tariff. Further, averaging the weighted exponential tariff difference for each good by the total number of goods exported lessens the bias associated with the trade intensity.

In addition to differences in the functional form and the scaling factor, our index differs from Fugazza and Nicita's index in the treatment of market participants. Fugazza and Nicita (2013) use the basket of goods an exporter ships to a given market and create a counterfactual scenario where these goods are exported by all other countries in the world to determine the trade weighted average tariff rates

[7] When rest of the world tariff rate is zero and the bilateral rate is also zero, then ERPM is replaced with 1. However, when the world tariff rate is zero and the bilateral rate is non-zero ERPM is replaced with 0.

for competitors. Instead, here the actual international market participants (η) are used for each product to compute this trade weighted average tariff. For example, if country i exports product k to country j, then all other countries supplying k to country j including country j and country i itself are identified as the actual market participants for a given year.

The lower the average tariff rates a country faces in destination market compared to the average trade weighted tariff rates faced by its other competing market participants, the greater the preferential margin the exporter receives and the higher is its relative preferential margin in that market. Preferential access is offered with an aim to increase trade. As such, increases in the relative preferential margin are expected to increase trade by increasing the relative competitiveness of the exporting trade partner. As with the ETRI, the value of ERPM also varies in the interval of $[0, e \sim 2.72]$. A score of one would indicate that, on an average, the tariff structure the importer faces is not different from what its foreign competitors face in a given import market. A score above (below) one indicates a larger (smaller) relative preferential margin as compared to competitors, which means the country likely has a greater (lesser) ability - in terms of being price competitive - to access a given market compared to its foreign counterparts.

For visual analysis, the behavior of the ERPM as compared to the level values of RPM is shown graphically in figure 3.1. For ease of exposition, the bilateral tariff rate (T_{ij}) is held constant at two extreme starting values eight and 99 percent (to contrast different bilateral rates) while letting the rest of world tariff (T^w) vary between zero and 80 percent. For clarity, the T^w is increased at a constant rate of five percent. Exponential functions are monotonic and unique in the sense that increases in the independent variable gives the same proportional change in the dependent variable. An implication in this case is that as T^w increases, the relative preference increases as we move away from zero and exponentiation of this ensures that the incremental increase in the preference advantage becomes smaller as we approach the upper bound of the support. This is important because if the tariff rate compared to competing suppliers is already low or the preference margin is very high, a large reduction in tariffs would be required for any further realization of preference advantage. A value of one ($exp(0) = 1$) represents a state of the world when there are no relative preferential margins ($T_{ij} = T^w$) while below one, the ERPM penalizes a preference disadvantage relatively more because in this interval (0 1) as the preference margin increases the increase in the exponent of the preference

margin is greater (the margin is moving from being negative to zero). Above one the ERPM reflects preference advantage but the incremental increase in the ERPM score is smaller. This implies that preferential advantages matter but the degree to which they are advantageous is not constant. Comparing ERPM at two extreme bilateral tariffs, $T_{ij} = 8$ and $T_{ij} = 99$, it can be seen that it takes longer for ERPM to take a non-zero value when pre-existing distortions are higher as in the case when the ERPM starting value is $T_{ij} = 99$. Further, as we move away from origin, the ERPM ($T_{ij} = 99$) increases but it never reaches one while for a lower pre-existing distortion at $T_{ij} = 8$, the ERPM reaches one quickly and approaches 2.45 at $T^w = 80$.

Thus, there are at least two advantage of the ERPM over more traditional preference margin indices. First, it is easy to identify the protectionist policy at all the values of TW. Second, it is easy to distinguish between two different types of policies. With the level values of RPM though, it is not as clear when the preference becomes advantageous or which policy is more protectionist.

3.3 Empirical Estimation of the Indices

While the proposed indices offer several advantages over existing indices, they are not without some limitations. Both ETRI and ERPM use import demand elasticities for HS-6 digit products. In practice elasticities are unobservable and have to be estimated before computing the indices. In this paper I make use of elasticities estimated in Kee et al. (2008) . While the index number is expected to be calculated rather than estimated, use of estimated indices from the literature introduces some measurement error as these elasticities are estimated with error (i.e., each HS-6 product estimation has a confidence interval associated with it).

Further, as these indices are separately computed for each year, the calculated index value might change simply because the trade weights change from year to year. While a common practice is to use fixed base trade weights for each year in the sample, this approach, however, introduces a new problem. Over a large span of time, changes in taste, preferences, technology, or regulation may impact the consumption, and thus the economic importance of some products. Using fixed weights would mask such changes and contradict the rationale for using trade weights in the first place. To address this issue, I propose to use a three-year moving average trade weights

(i.e. in calculating trade weights for year t, I average trade values over the years t, t-1, and t+1) instead of using any fixed trade weights. Further, weighted indicators tend to produce higher relative preferential margin score and higher trade restrictiveness score when countries trade intensely in less protected products because, by construction, larger trade values get larger trade weights. By averaging the sum of ETRI/ERPM score of each product by the total number of products traded in a bilateral trade relationship, this endogeneity issue is softened to some extent.

Before turning to the estimating equations, in the section below I introduce a first-pass gravity equation as in Baldwin and Taglioni (2006) and Anderson and Van Wincoop (2003) to indicate where the above indices might fit with the standard theoretically motivated gravity equation.

3.4 First-Pass Gravity and Fit of ETRI and ERPM in the Equation

The classical concept of gravity equation was inspired from Newton's Law of Universal Gravitation. The law states that the force of gravity (F) between any two objects is directly proportional to their masses (M_1, M_2) and indirectly proportional to the square of distance (R_{12}^2) between them. Writing the equation with equality, leads to the addition of a Gravitational constant (G) term as below:

$$F = G\frac{M_1 M_2}{R_{12}^2} \tag{3.15}$$

In its application to trade, the force of gravity is replaced with trade values between two countries and the physical mass variables are replaced with economic mass variables–GDP of importing and exporting countries. While simple in its form, the gravity equation fits with data very well. As Baldwin and Taglioni (2006) notes a fit of 0.7 is "at par" with a large branch of trade literature. While the equation appears simple, Anderson and Van Wincoop (1979, 2003) have provided clear microeconomic foundations of the gravity equation. Baldwin and Taglioni (2006) simplified the original derivation into six steps. I follow this later study closely to show how the trade restrictiveness terms ETRI and ERPM fit within the gravity framework.

Step 1:The expenditure share identity
Below is the expenditure share identity for a single good exported from country of origin -o to country of destination -d

$$p_{od}x_{od} \equiv share_{od}E_d \tag{3.16}$$

where x_{od} is the quantity of bilateral exports of a good from country o to country d, p_{od} is the 'landed price' of the good in country d measured relative to a numeraire good. Thus the term of the left hand side of the above equation is the value of the trade flows measured in terms of the numeraire. E_d is the expenditure on goods traded by the destination country d, and $share_{od}$ is the expenditure share in country d on a typical variety imported from country o.

Step 2: The expenditure function: shares depend on relative prices
From consumer theory, we know that the shares depend upon relative prices and level of income. However, this relation is simplified by assuming that the share depends only on the relative prices. Further, using the Constant Elasticity of Substitution (CES) demand function, the imported good's expenditure share can be related to its relative price as follows:

$$share_{od} \equiv (\frac{p_{od}}{P_d})^{1-\sigma}, where P_d \equiv \left(\sum_{k=1}^{R} n_k (p_{od})^{1-\sigma}\right)^{\frac{1}{1-\sigma}}, \sigma > 1 \tag{3.17}$$

where $\frac{p_{od}}{P_d}$ represents the 'real price' of p_{od}. By that, P_d is the ideal CES price index faced by consumers in country d. Implicit in this is the assumption that all goods are traded. R represents the number of countries that trade with country d or more precisely it is the number of countries that country d buys goods from, including itself. Further, assuming goods differ only by source of origin (Armington Assumption), a variety index in the CES price index is avoided. Then from (3.16) and (3.17) a product specific import expenditure equation is obtained:

$$p_{od}x_{od} \equiv (\frac{p_{od}}{P_d})^{1-\sigma} E_d \tag{3.18}$$

While the expenditure could be estimated directly, researchers often lack data on trade prices. Thus, it necessitates more structure on the problem.

Step 3: Adding the pass through equation
The landed price of the good produced in country o as faced by consumers in des-

tination d can be linked to the bilateral mark-up (μ), producer's price in country of production o (p_o), and the bilateral trade cost (τ_{od}) :

$$p_{od} = \mu p_o \tau_{od} \tag{3.19}$$

where μ is a parameter and is assumed to take a value of one as in Dixit-Stiglitz monopolistic competition or perfect competition with Armington model. The bilateral trade cost (τ_{od}) includes all man-made and natural costs. However, information on these costs are not available/observable to econometrician and are typically not estimated. Therefore, we can add more structure to this term as discussed below.

Step 4: Adding another pass through: tariff and non-tariff trade costs are partitioned
I partition the set of bilateral trade cost variables into two groups, tariff and non-tariff related trade costs. I write this trade cost vectors in the form $\tau_{od} = (t_m, t_{\sim m})$ where t_m is tariff related cost and $t_{\sim m}$ is a vector of non-tariff related trade costs that is not a part of t_m. Then there exists an aggregator function τ^* such that $\tau_{od}(t_m, t_{\sim m}) = \tau^*(f(t_m), t_{\sim m})$ implying that this function is separable.[8] Now, considering MFN rates as the benchmark world prices, the tariff cost is the difference between the effective tariff and MFN rate. A variety of index could capture this effect, however, in the context of growing preferential trade agreements the assumption that tariffs that are placed too high relative to the MFN rate form more important barriers in international trade is not a far-fetched assumption. Under this assumption, I offer the exponential form of trade restrictiveness index as a potential solution. That is, I propose to capture this tariff part of the trade cost term using Exponential Trade Restrictiveness Index developed above. Then, I can re-write bilateral trade cost as some mark up of tariff barriers as below:

$$\tau_{od} \equiv \psi ETRI_{od} \tag{3.20}$$

where ψ is a mark up intended to capture the non-tariff part of the bilateral trade cost, and is the exponential tariff restrictiveness index.

Step 5: Aggregating across individual goods
Thus far a single good example was considered. To get a value of total bilateral

[8]While the second argument in τ^* is a column/row vector, the first argument is a vector of dimension 1x1. Further, as tariff increases trade cost increases too, therefore the function is increasing in the first argument.

exports from country o to country d, we simply multiply the expenditure share function by n_o which represents the number of goods country o has to offer to country d. As already mentioned, these are symmetric variety goods. Further, representing the total value of the trade by V_{od} , we have

$$V_{od} \equiv n_o * share_{od} * E_d, and$$
$$V_{od} = n_o(p_o\tau_{od})^{1-\sigma}\frac{E_d}{P_d^{1-\sigma}} \tag{3.21}$$

However, lacking precise data on number of varieties n_o, and producer prices p_o, we use $o's$ general equilibrium condition to solve the problem.

Step 6: Using general equilibrium in the exporting nation to eliminate the nominal price

For market clearance, the producer's price p_o and wages in the exporting country o should adjust in a way that it sells all its products at home or abroad. In step 5, we have country $o's$ sales to one destination d. If we sum over all such destination markets including it's own market, we get total sales of country $o's$ goods. Assuming all the goods produced are traded, total production in country o equals its total sales and the market clearance is achieved which can be represented as:

$$Y_o = \sum_{d=1}^{R} V_{od} \tag{3.22}$$

where Y_o is country $o's$ output measured in terms of the numeraire. Now using (3.21) in (3.22), the above market clearing condition can be re-written as follows:

$$Y_o = n_o p_o^{1-\sigma} \sum_{d=1}^{R}\left(\tau_{od}^{1-\sigma}\frac{E_d}{P_d^{1-\sigma}}\right) \tag{3.23}$$

where the summation is over all markets (including $o's$ own market). Then solving for $n_o p_o^{1-\sigma}$ in the above equation we get,

$$n_o p_o^{1-\sigma} = \frac{Y_o}{\Omega_o}, where \tag{3.24}$$
$$\Omega_o \equiv \sum_{i=1}^{R}\left(\tau_{od}^{1-\sigma}\frac{E_d}{P_d^{1-\sigma}}\right)$$

where Ω_o measures the openness of the world to country $o's$ exports.

Step 7: A first-pass gravity equation: adding a third pass through to the equation
Using the above equation (3.24) in (3.21), we get the 'first-pass' gravity equation:

$$V_{od} = \tau_{od}^{1-\sigma}\left(\frac{Y_o E_d}{\Omega_o P_d^{1-\sigma}}\right) \tag{3.25}$$

$$\Omega_o \equiv \sum_{i=1}^{R}\left(\tau_{od}^{1-\sigma}\frac{E_d}{P_d^{1-\sigma}}\right)$$

As already mentioned all the variables are measured in terms of the numeraire. This equation is micro-founded gravity equation developed by Anderson and Van Wincoop for cross-sectional data and later reproduced and extended to the case of panel data by Baldwin and Taglioni (2006). However, estimating trade effects as above is problematic because we do not have data on the multilateral resistance term Ω_o. A common work around to this problem is to use various panel fixed effects such as country-pair or country-time varying dummies. Focusing on terms inside the bracket in the multilateral resistance term, we see that Ω_o is correlated with bilateral trade cost, τ_{od} and thus also to the tariff portion of the cost. Additionally, Ω_o includes τ_{od} for all countries in the world as the former involves summation across all countries including itself implying that additional tariff barrier that is correlated across countries has also been introduced into the gravity equation through Ω_o. While systematic manipulation of the multilateral resistance term that contains CES expenditure function is not within the scope of this paper, I offer an index that are country-pair and time varying that are also correlated across countries as a solution to purge the tariff effect from Ω_o. A simple structure for Ω_o is as follows:

$$\Omega_o \equiv \phi ERPM_{od} \tag{3.26}$$

where the parameter ϕ is jointly distributed with the parameter ψ defined in step 4 and $ERPM_{od}$ is the exponential relative preferential margin, which measures the relative tariff restriction (preference) compared to all of $o's$ competing suppliers. The next section below focuses on empirical estimation of the gravity equation.

3.5 Empirical Estimation of the GSP effect

Based on the framework of Dixit-Stiglitz (1977) and Anderson and Van Wincoop (2003), a standard gravity model is developed to assess how the ETRI and ERPM impact trade flows. A detailed derivation of the gravity equation is available in Appendix 1. Starting with the first-pass gravity equation above we have [9]

$$X_{ijs} = \alpha_{ijs} * \tau_{ijs}^{1-\sigma} \left(\frac{Y_{is} E_{js}}{\Omega_{is} Q_{js}^{1-\sigma}} \right) \tag{3.27}$$

$$\Omega_{ij} = \sum_{i=1}^{R} \left(\tau_{ijs}^{1-\sigma} \frac{E_{js}}{Q_{is}^{1-\sigma}} \right)$$

where, X_{ijs} is expenditure of country j on all the products belonging to sector s that are imported from country i, α_{ijs} is a preference parameter for all the products in the sector supplied by country i to country j, τ_{ijs} is the sectorial composite price faced by consumers in country j (it includes all trade costs such as freight costs and tariffs) for the goods imported from country i, Y_{is} is the sectorial exports from country i, E_{js} is the expenditure on all products belonging to the sector s in country j regardless of where the products originate, Q_{js} is the composite price index of all the goods belonging to sector s in country j, and Ω_{is} is the outward multilateral resistance which measures real market potential for country $i's$ export of all its products belonging to the sector s. E_{js} is the expenditure on all products belonging to the sector s in country j regardless of where the products originate,Q_{js} is the composite price index of all the goods belonging to sector s in country j, and Ω_{is} is the outward multilateral resistance which measures real market potential for country $i's$ export of all its products belonging to the sector s. E_{js}, which is a function of the price index, in practice is not observable and is assumed to be a function of total income in country j, (i.e $E_{js} = GDP_j^{\beta_1}$) (Peterson et al. 2013). Assuming a homothetic utility function, the coefficient on GDP can be shown to equal one for total merchandise trade; for sectoral analysis, however, this is not necessarily the case because the associated sub-utility function need not be homothetic. Similarly, as Peterson et al. (2013) note, $GDP_i^{\beta_2}$ can be used, as a proxy for Y_{is}. X_{ijs} is replaced with the value of exports from country i to country j. The relative preferential margin and trade restrictiveness index proposed in Anderson Van Wincoop's (2003) structural gravity

[9]The symbols are slightly different from the first pass gravity equation developed in section 3.5 to keep it consistent with the derivation in Appendix 1.

equation can also be adopted in a specification for sector-level trade.

Ω_{is} can be written as a function of price index as faced by consumers in each importing country, expenditure of each importing partner on goods from country i, and bilateral trade cost faced by the exporter i with each partner. Data on each of these variables is not available in practice. In the original AvW model, this term is designated to capture the effect the outside world has on trade between two countries. In other words, this term measures the real market potential for country i's export. The price index, Q_{js}, is a function of producer's price in each exporting country augmented by all the trade costs in shipping to destination j. Thus the functional form Q_{js} assumes in the structural gravity equation makes tariff costs non-separable from other costs. In the general equilibrium model by AvW, these two terms (frictions) would jointly shape the bilateral trade. However, if we ignore the general equilibrium feedback (i.e. frictions in exporting to outside world does not affect the frictions in bilateral trade) but take into account only the more direct cost of trade barrier (i.e the trade barrier the partner applies on all other exporters), then we can use the ERPM to proxy these resistance terms, $\Omega_{is}Q_{js} = ERPM_{ijs}^{\beta_3}$. β_3 need not be equal to one, because ERPM is estimated focusing on tariff restrictions, whereas the price terms are comprehensive of all tariff and non-tariff restrictions. ETRI can more easily proxy τ_{ijs} i.e $\tau_{ijs} = ETRI_{ijs}^{\beta_4}$ where the parameter need not equal $(1-\sigma)$ for similar reason.

An advantage is that these indices (both ETRI and ERPM) have the same dimensionality of the trade data which fit with the gravity equation multilateral resistance terms discussed above. In lack of measurable observables, it is not uncommon to proxy these terms with the use of time invariant variables such as distance, language, cultural ties etc. Further, pseudo maximum likelihood estimation with the currently available statistical software complicates the inclusion of various fixed effects with higher dimensions (see Santos Silva and Tenreyro, Silvana's The Log of Gravity webpage).[10] However, failure to include these variables might lead to an omitted variable bias. Thus, econometrically ERPM and ETRI address the tariff component of multilateral resistance in this problem.

The empirical model consists of panel gravity model and various fixed effects to fully account for unobserved heterogeneities; here time subscript is suppressed to ease

[10]http://personal.lse.ac.uk/tenreyro/LGW.html

the notation. Anderson and Van Wincoop (2003), Baldwin and Taglioni (2006) and Feenstra (2003) suggest using time-varying-country fixed effects to control for the multilateral resistance term. As described above, in partial equilibrium simplification (abstracting away from general equilibrium feedbacks) I use ERPM and ETRI to control for the multilateral resistance terms. However, these terms do not fully take into account non-tariff related trade costs. Therefore, I supplement these proxies with country-specific fixed effects. While the sector by time-varying country specific fixed effects would have been the first choice to control for non-tariff related heterogeneity, considering the relatively short period of time (2000-2009) in the sample and the fact that any substantial change in international policy would require longer time period, I use country-specific fixed effects, product fixed effects, and time effects separately. Further, I include a discrete variable to denote GSP status for the exporter, and an interaction term to capture the effect of ERPM on GSP. Then, the structural gravity equation above leads to the following empirical model:

$$X_{ijkt} = exp\Big(\phi_j + \phi_i + \phi_k + \phi_t + \omega_1 lnGDP_{jt} + \omega_2 lnGDP_{it} + \omega_3 lnRER_{ijt} + \\ + \omega_5 log(1 + ETRI_{ijkt}) + \omega_6 log(1 + ERPM_{ijkt})\Big)\epsilon_{ijkt} \quad (3.28)$$

where ϕ_j is importer fixed effect, ϕ_i is exporter fixed effect, ϕ_k is product fixed effect and ϕ_t is time changing effect, RER is the real exchange rate, k represents the sector and ϵ is the stochastic error term for the sector. The above specification allows me to estimate how the preference margins impact trade. To identify the GSP effect, I also incorporate GSP- an indicator variable into the above equation. The GSP variable takes a value of one if the exporter i receives GSP preferential treatment from its trade partner j in the year i. I include the exchange rate in the specification for the following reasons. Fitzgerald (2004) point out that if elasticity of substitution between home output and imports is less than one, there will be a weak link between price of imports and price of domestic product. This home bias in consumption would then reduce the sensitivity of inflation to exchange rate changes. As a limiting case, when two countries do not trade at all, exchange rate can fluctuate infinitely without affecting domestic prices and quantity variables. Further, if trade is skewed towards partners with more stable exchange rates, the impact of exchange rate volatility on prices is low meaning the price terms in gravity equation do not absorb the exchange rate effect completely (see for e.g., Goldberg and Knetter 1977 and Anderson, Vesselovsky and Yotov for more detailed discussion of the incomplete pass

through of the exchange rate effects in price terms of the gravity equation in trade). Further, these authors conclude that the exchange rate effect varies by industries and sectors. Therefore, I include the exchange rate in the empirical specification to fully control for their differential impacts across sectors. Additionally, gravity equation variables such as distance, language, border, colonial status, and the other policy variables such as membership in WTO, both trading partners in the same Regional Trade Agreement are switched on and off in the estimating equation for comparisons. Further, to estimate whether tariff preferences have a differential impact on GSP recipients, a following equation that incorporates interaction of log(1+ERPM) with the GSP variable is estimated

$$X_{ijkt} = exp\Big(\phi_j + \phi_i + \phi_k + \phi_t + \omega_1 lnGDP_{jt} + \omega_2 lnGDP_{it} + \omega_3 lnRER_{ijt} + \omega_4 GSP_{ijt} + \\ + \omega_5 log(1+ETRI_{ijkt}) + \omega_6 log(1+ERPM_{ijkt}) + \delta_1 (GSP_{ijt} * log(1+ERPM_{ijkt}) \Big) \epsilon_{ijkt} \tag{3.29}$$

All the notations are as above. As in previous equation, the continuous explanatory variables are specified in logarithmic form. Further, a more flexible model that allows me to estimate the effect of preference margins on GSP recipients' exports by sector k is:

$$X^k_{ijt} = exp\Big(\phi_j + \phi_i + \phi_t + \omega_1 lnGDP_{jt} + \omega_2 lnGDP_{it} + \omega_3 lnRER_{ijt} + \omega_4 GSP_{ijt} + \\ + \omega_5 log(1+ETRI_{ijkt}) + \omega_6 log(1+ERPM_{ijkt}) + \sum_{k=1}^{K} \delta_1 (GSP_{ijt} * log(1+ERPM_{ijkt}) \Big) \epsilon^k_{ijt} \tag{3.30}$$

where $K = 15$ is the total number of agricultural sectors in the current dataset, and all other notations are as above. In the current data set, about 2.5 percent of the observations show ETRI score of zero and logarithmic transformation of zero is mathematically undefined. Therefore, in the above specifications, the logarithm of exponential indices is scaled by one to retain such observations. Before settling on an estimation technique, I want to explore the data for the type of variability it

exhibits. In table 3.4, I present summary statistics of the data set showing within and between variations for major variables. As can be seen, each variables show non-zero within variation hinting towards fixed effect estimation. However, these entire variables have large between effects as well. Thus, performing traditional fixed effect estimation, which requires the within transformation that wipes out all time invariant and individual invariant heterogeneities, a lot of information would be lost. While the random effect would be efficient in this case, the exogeneity of these variables with unobserved trade pair heterogeneity is a tenuous assumption. Further, the Hausman test rejects the null of exogeneity meaning random effect estimation would be inconsistent in this case. Thus, the pseudo-poisson maximum likelihood (ppml) estimator emerges as my choice of model. Another compelling reason for choosing the ppml estimator is that it allows to estimate the gravity equation in its original multiplicative form. While estimating the gravity equation after logarithmic transformation is very common, it leads to inconsistent estimates except under very restrictive set of assumptions on the functional form of the error term. In a monte-carlo simulation study, Silva and Tenreyro (2006) have shown that estimating gravity equation in multiplicative form produces consistent estimates in wide range of scenarios with minimal distributional assumption on the error term. Therefore, in this paper I adopt ppml estimators and estimate the gravity equation in its multiplicative form. Additionally, this estimator unlike commonly held belief that the Poisson model assumes equal dispersion between variance and mean, it is robust to both under and over dispersion in the data, which the trade data suffers from.

3.6 Data

Similar to the previous chapter, the dataset used here consists of bilateral trade flows for agricultural and non-agricultural sectors. The main difference, however, is that this chapter includes a product/sector dimension and the addition of tariffs and import demand elasticities. The trade data is obtained from United Nation's COMTRADE database and is at HS-6 digit level. The tariff data are from the World Integrated Trade Solution's (WITS) web portal accessed through the Trade Analysis and Information System (TRAINS) database and is also at HS-6 digit level. UNCTAD and the World Bank have jointly computed ad valorem equivalents of non ad valorem tariffs. Given that the agriculture sector has numerous specific tariffs, I use the ad valorem equivalents available in TRAINS database. This database adopts a three-step procedure for estimating unit values: (1) from tariff line import statistics

of the market country available in TRAINS; (2) if (1) is not available, from the HS 6-digit import statistics of the market country from UN COMTRADE; (3) if (1) and (2) are not available, from the HS-6-digit import statistics of all OECD countries. Data on import demand elasticities, also at the HS-6 digit level are retrieved from Kee et al. (2009). The GSP indicator variable is compiled from individual GSP-handbooks[11] and GSP Newsletters[12] accessed through the United Nations Conference on Trade and Development (UNCTAD) website, and from the list of preferential trade arrangements obtained from WTO's PTA database.[13] First, a list of GSP granting and beneficiary countries along with the year of implementation is prepared using the earliest possible handbooks on each GSP programs (to mention a few, for e.g., GSP handbook on the scheme of Norway, 1999; GSP handbook on the scheme of the Republic of Poland, 1999; GSP handbook on the scheme of Australia, 2000, etc). Then the list is supplemented with the data from the most recent GSP handbook available of the program. Updates on new GSP beneficiaries are also cross-checked with the UNCTAD GSP Newsletters. A total of 18 handbooks and eight Newsletters were referred to in developing this list. The GSP list is finally supplemented with information of eligible recipients available in WTO's database on preferential trade agreements. Data on Gross Domestic Product or GDP are from World Bank's database on World Development Indicators.[14] Data on Gravity variables are from database on GeoDist available in Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)- Research and Expertise on the World Economy's website.[15] The agricultural sector level dataset is obtained first by aggregating HS-6 digit agriculture products into 23 HS-2 agriculture chapters. This concordance is retrieved from United Nations International Trade Statistics Knowledgebase.[16] The 23 HS-2 agriculture chapters appear in the section one to four (excluding chapter 03 *Fish and*

[11]United Nations Conference on Trade and Development. 2015. Handbooks on the GSP schemes. Accessed at: `http://unctad.org/en/Pages/DITC/GSP/Handbooks-on-the-GSP-schemes.aspx`

[12]United Nations Conference on Trade and Development. 2015. GSP Newsletters. Accessed at: `http://unctad.org/en/Pages/DITC/GSP/GSP-Newsletters.aspx`

[13]World Trade Organization. 2015. Preferential Trade Arrangements: List of PTAs. Accessed at: `http://ptadb.wto.org/ptaList.aspx`

[14]World databank. 2015. World development indicators: popular indicators (GDP at market prices) Accessed at: `http://databank.worldbank.org/data/reports.aspx?Code=NY.GDP.MKTP.KD.ZG&id=af3ce82b&report_name=Popular_indicators&populartype=series&ispopular=y`

[15]CEPII-Research and Expertise on the World Economy. 2015. GeoDist. Accessed at: `http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6`

[16]United Nations International Trade Statistics Knowledgebase. 2015. HS classification by section: HS 2002 sections- general rules for the interpretation of the Harmonized System. Accessed at: `http://unstats.un.org/unsd/tradekb/Knowledgebase/HS-Classification-by-Section?Keywords=HS+code+search`

crustaceans, molluscs and other aquatic invertebrates of section I) of HS-2 classification system. Further, the section IV of HS-2002 section that consists of chapter 16 to 24 is aggregated into a single sector *"Prepared foodstuffs"*[17]and thus obtaining total of 15 agriculture sectors. Table 3.1 lists these 15 agriculture sectors in four columns consistent with four sections in HS-2 classification system.

Mirrored trade flows are used to complete the trade data. That is, when exporters' reported export statistics to any given partner are missing, importers' reported imports statistics for the same country-pair are used. The cutoff to determine an eligible shipment is US $1,000 worth of a product exported to a trading partner. The agricultural and non-agricultural datasets consists of 613 and 3,906 HS6-digit products traded between 94 exporting and 59 importing countries for a total of 2,005,478 and 10,106,821 observations per dataset, respectively. The sector level agriculture data set consists of 15 sectors for a total of 252,941 observations. The data are available for the year 2000 to 2009 and are unbalanced in the sense that not all the countries export an equal number of products or trade with an equal number of partner countries. Table 3.2 lists the 94 countries used in this research.

Table 3.3 reports summary statistics of the product exported and countries exported to annually in the agriculture sector. For example, in the beginning of the sample period 94 countries exported 602 agricultural products to 35 importing countries. At the end of the sample period, though, countries supplied fewer products - 535 compared to 602 in 2000 - but to a greater number of countries (52 compared to 35 in 2000). While the HS-6 digit data were used for the computation of indices, econometric analysis was done using sector level trade data.[18]

[17]The sector *"Prepared foodstuffs"* consists of following nine HS-2 chapters:

16 Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates

17 Sugars and sugar confectionery

18 Cocoa and cocoa preparations

19 Preparations of cereals, flour, starch or milk; pastrycooks' products

20 Preparations of vegetables, fruit, nuts or other parts of plants

21 Miscellaneous edible preparations

22 Beverages, spirits and vinegar

[18]At the product level tariffs and observed trade flows are endogenous while aggregating to some

Exporting member countries vary in the extent to which they utilize the GSP preferences. Fig 3.2 shows the share of agricultural exports from GSP receiving countries to high-income markets for 13 least developed countries for the year 2009. For example, Benin shipped 2.5 percent of its total agricultural exports to its GSP providers while this figure is 75 percent in case of Cŏted'Ivoire. Further out of 14 (25) total trade partners, five (five) provide GSP to Benin (Cŏted'Ivoire). Both of these countries receive GSP preferential treatment from the United States and the European Union. Uganda, Tanzania, Malawi, Madagascar are some other countries that export about 50 or more percent of its agricultural products to GSP partners which in value terms ranges from one to eight billion USD. Out of these 13 countries, nine countries exported agricultural products to the United States in 2009.

3.7 Results and Discussion

This section is organized in two sub-sections. In section one, I discuss the estimated ETRI and ERPM indices by comparing them across time and countries. In subsection two, I present the formal econometric results and discuss how the ETRI and ERPM impact trade flows.

3.7.1 Market Accessbility: ETRI and ERPM

Figure 3.3 plots the level of ETRI in 2009 against the level of ETRI in 2000 for agricultural and non-agricultural sectors. The clustering follows a distinct pattern for ETRI scores above and below one. For example and recalling that higher ETRI scores correspond to more advantageous preferences relative to the multilateral MFN tariff, for values above one, the clustering is above the 45-degree line indicating the agricultural markets have been liberalized relative to MFN rates during the sample period. This means the exporters who were facing average tariff rates similar to the MFN rates in agriculture have received further liberalization in this sector through 2009. Even for ETRI scores below one, reflecting a more protectionist policy initially, the clustering is again above the 45-degree line indicating that tariff rates for these

extent moderates this issue.

exporters have become a little less restrictive over time. However, the slight upward drift above the 45 degree line between the two years may be more pronounced when the relative preferential margin is considered.

In non-agriculture sector, on the other hand, the clustering is very close to the 45-degree line indicating there has been very little change in the ETRI score. The implication of this is twofold. First, non-agricultural MFN tariffs are generally low as described by (CITE something here) averaging less than five percent worldwide. Second, because multilateral non-agricultural tariffs are already low, that most exporters face a similar average relative (to MFN) tariff through out the sample period in non-agricultural goods. However, around the ETRI score of 1, the clustering is above the 45 degree line which implies that the exporters facing a neutral policy in 2000, relative to the MFN rate, have moved on to receive less restrictive average tariffs by 2009.

The distribution of bilateral ERPM for the first and the last year of the sample are shown in Fig.3.4 for five major agricultural import markets: (i) the U.S., (ii) the European Union (as a single market), (iii) Canada, (iv) Japan, and (v) Australia. This figure compares the relative preferential margins exporters faced in those agricultural markets in year 2009 to the relative preferential margin the exporters faced in the same markets in the year 2000. Three points are worth noting. First, an important question is whether the distribution curve lies more to the right of an ERPM score of one?

For example, in case of USA most of the density plot for the year 2009 (the blue curve) lies to the right of a neutral ERPM score of one, meaning more suppliers face a preferential margin of greater than 1 relative to their competing suppliers in 2009 as compared to in the year 2000. This important trend likely reflects the numerous free trade agreements the US has signed since the turn of the century. By way of example, the United States signed FTAs with 14 additional countries during the sample period.

Second, another important question is whether the distribution is tightly centered around a particular value or whether the distribution is more spread out. For example, in Canadian agricultural market, export suppliers face a much more widely distributed set of relative preferential tariffs. As noted earlier in the case of cut flowers, this likely reflects the fact that Canada's GSP program is quite variable de-

pending on the product and country of origin in question.

Third, it is important to note whether the distribution (blue) curve for year 2009 lies below or above the distribution (red) curve for the year 2000. For example in case of EU, near the upper bound, the distribution for year 2009 (blue curve) lies below that of the distribution for year 2000 (red curve). This suggests that the number of countries receiving relatively higher preferences in the EU has decreased over the sample period. However, around an ERPM value of one, the distribution for year 2009 lies above that of year 2000, which means previously restrictive tariffs have moved towards neutral rates. The EU has moved from being discriminatory to non-discriminatory in this range. More precisely, in the EU market, the distribution of the ERPM for the year 2009 is more tightly centered around 1 than for the former year, and peaks on 0.8, whereas for the year 2000, most of the distribution is located to the right of one and peaks at 0.6. This indicates that EU preference have shifted from being more preferential (higher preferential margin) and more discriminatory (providing preferential benefits to fewer countries) to being less preferential and less discriminatory in the agriculture sector. In general, the Australian preferential system became less discriminatory and more preferential in agriculture sector at the end of the sample period. The same can be said for the US and Japanese preferential system for agriculture sector. Canadian preferential system, however, remains very discriminatory throughout the sample period.

A common feature in these agricultural markets, except for EU, is the degree of preference erosion. Exporters with higher market accessibility in the first year of the sample faced further liberalization during the sample period. Those left out of initial preferences were penalized compared to their foreign competitors. However, the number of penalized partners has declined over the years. For example, in 2000 almost 50 percent of the exporters faced a relative preference margin of less than one (i.e faced higher trade weighted tariff rates compared to their competing foreign exporters) in the US agricultural market, but as of 2009, this number has gone down to being less than 20 percent.

The change in the ERPM exporters faced in non-agricultural markets in year 2009 compared to the year 2000 is presented in Fig.3.5. Unlike in the agriculture sector, in non-agriculture sector the ERPM tends to approach the bounds and is no longer centered around one. This means exporters facing slightly higher average trade weighted tariffs compared to their competitors are likely to face severe mar-

ket restrictions while the countries receiving slightly lower tariff rates on average are likely to face highly liberalized markets in the non-agriculture sector. The EU is exception to this rule. The EU preferential system has become less discriminatory and therefore less preferential in non-agricultural sectors. However, it is hard to make concrete comparisons between agriculture and non-agriculture because the former was split into 15 sectors while the latter is aggregated up to just a single non-agricultural sector. This shortcoming will have to be addressed if one wishes to make comparisons between sectors.

This evidence of changing market accessibility and evolving preferential trade agreements points to the need for economic research to explore how the interaction of these market conditions affect the extent of trade liberalization offered. The importance of this has been hypothesized in a handful of theoretical studies (Kee et al., 2013; Fugazza and Nicita, 2013; Carrere et al., 2010), including work by Wonnacott and Wonnacott (1981) who claim that although non-reciprocal preferential trade agreements reduce the cost for an importer through the reduction or elimination of the import tax, they do not necessarily provide the much needed foreign market access to the exporter. Preferential tariff benefits to the exporter depend not only on the overall trade restrictiveness of the market with respect to the most favored nation rate (ETRI) but also on the relative trade restrictiveness with respect to competing suppliers (ERPM) and quite possibly the interplay of the two. To make more specific policy recommendations about multilateral and relative preferential margins and their impact on trade, the results from a formal econometric model need to be examined which I turn to next.

3.7.2 Econometric Results

The results are organized into five sections. First, I discuss the results associated with equation 3.27 that includes the ETRI and ERPM but no GSP effect. Distance, borders, languages are also omitted. Second, I estimate a model similar to chapter two but with a GSP, ETRI, and ERPM variables included. Third, I turn to interaction between GSP and ERPM. Also, I explore the ERPM effects by interacting ERPM with the 15 sector dummies.

Assessing the Effects of Trade Tariff Preferences

Table 3.5 column [1-6] reports the estimated effect of tariff preferences on trade. Column 1 and 2 include all the observations in the sample, while column 3 and 4 report coefficients for the year 2000 (sample beginning year) and column 5 and 6 show the coefficients for year 2009 (sample end year). In this case, ETRI and ERPM are country pair specific time varying and sector varying in nature. Since the ETRI does not take into account the relative preferences which the other competing suppliers receive with the common trade partner, it is expected to produce coefficient of higher magnitude compared to that of ERPM. As we see, the coefficients on log (1+ETRI) and log (1+ERPM) are positive and statistically significant which means both the direct and the relative preferential margins have significant impacts on bilateral trade. Economically, as the ETRI score increases by one percent, implying that as the trade restriction relative to MFN rate expressed in exponential form decreases by one percentage agricultural exports increase by about 3 percent (column 1). Similarly, while the same percentage increase in the ERPM also leads to an increase in exports but by a smaller magnitude. That is a one percent increase in the ERPM increase exports by two percent (column 2). This result is consistent across specifications and in every specification in Table 3.5 the ETRI is greater in magnitude than the ERPM. For example, in the year 2009 one percentage increase in ETRI increased the bilateral trade by 3.56 percent while the same increase in ERPM increased the trade by 2.7 percent. While both margins are clearly important for bilateral trade, the initial results suggest that exports are more sensitive to changes in direct market access as opposed to relative market access.

Assessing the GSP Effects on Agriculture Trade

Now the ETRI and the ERPM are used in gravity framework to estimate the GSP effect on agriculture trade. The results are presented in table 3.6. This specification is important because while GSP is one preferential trade arrangement, there are other PTAs that offer preferential treatment to their trade partners. By including these two indices that measure direct and relative tariff preferences of the existing preference system, the GSP effect is estimated considering all the other PTAs as well. While these two variables are intended to take into account the tariff portion of the multilateral resistance terms country specific and product specific terms are also included in the model to take into account the non-tariff barriers.

As can be seen, standard gravity equation explanatory variables such as GDP, distance, contiguity, colonial relationship and common language take the expected sign and are statistically significant. The coefficients on GDP, although not unitary as expected of a non-homothetic sub-utility function, are positive and closer to one than zero. As expected, trade flows decrease with the distance and area of the exporter, while sharing border, being members in a same Regional Trade Agreement, both being WTO members, having a common official language or having colonial ties increases the trade between partners, ceteris paribus.

Table 3.6, column (1) reports the benchmark analysis, which does not include the effect of direct and relative preference margins through the ETRI and ERPM indices. To facilitate comparison with the previous chapter but a different agricultural dataset with 15 sectors, I include the traditional GSP dummy variable. Again I find that the GSP variable is positive and statistically significant implying that beneficiary countries receiving GSP preferences increase their exports by exp(0.248)-1)=28 percent, on average.

More interesting is the behavior of the GSP variable when I account for direct and relative preferential tariffs. Inclusion of the ETRI in the specification in column (2) decreases the GSP coefficient modestly to 0.233 which suggests that the incremental gain in exports from GSP-receiving countries compared to that of non-recipients now falls from 28 percent to 26 percent. While coefficient on ETRI (3.475) suggest that as the exponent of tariff rate compared to MFN rate decreases by one percent, trade increases by about 3.5 percent. Furthermore, including ERPM to the benchmark specification as in column (3), further decreases the coefficient on GSP variable to 0.231. This indicates that when tariff component is not included in the model, the GSP dummy variable picks up the total effect of tariff and non-tariff related factors. As expected, the GSP coefficient falls when specifically accounted for the tariff part with the ERPM, however this fall is small indicating that other factors of the multilateral resistance are important as well.

As already described in the model section, ETRI is intended to capture the tariff component of the bilateral trade cost term in gravity equation while ERPM is intended to capture the tariff component of the outward multilateral resistance the country faces in exporting with respect to its competing suppliers in the rest of the

world. Therefore, both these terms are included along with traditional time-invariant trade-cost variables in the model specified in column (4). The result shows that the coefficients on ETRI and ERPM are positive and significant reflecting the fact that higher preference margins relative to both MFN rates and competing suppliers increase bilateral trade in a given importing market. Additionally, the coefficient on GSP is found to be similar in specification (2), (3) and (4) while is distinct from benchmark specification in column (1). In the section below the GSP effect is analyzed by exploring market accessibility across five major agricultural markets and across sectors.

Assessment of the GSP effect in trade literature is often limited to dummy variable approach and mostly report a negative trade effect. For example, Herz and Wagner (2011) reported a decrease in total exports from GSP recipient countries by 22 percent in the long run. Hoekman and Ozden (2005), Ozden and Reinhardt (2005), and Panagariya (2003) are also among the studies that claim negative GSP effect. In my previous chapter, using agriculture and non-agriculture trade I show that the GSP effect is positive for agriculture sector and is particularly higher in case of primary agricultural products. Here, taking account of the preference margin of competing suppliers and other PTAs through ETRI and ERPM, I find that the GSP effect is still positive and significant but is more muted compared to the type of effect received in the previous paper.

Assessing the Relative Market accessibility of the GSP Program

Preferential tariff benefits are offered with an aim to enhance trade between countries. As such, if lower tariff rates through GSP programs have successfully facilitated market access then we would expect this impact to show up in the form of increased exports from GSP recipients when compared to non-recipients. More precisely, the relative preference margin might have differential impact on GSP receiving and non-receiving countries. Therefore, a model including an interaction of GSP dummy variable with the preferential margin is specified to more specifically assess the relative preferential gains of GSP beneficiaries. The coefficient on this term can be interpreted as a percentage increase or decrease in exports from GSP recipient countries when the exponent of the tariff reduction relative to competing suppliers increases by one percentage while taking exports from non-recipient countries as benchmark. Further, I evaluate this relative market accessibility of the GSP recipient countries by

considering five developed agricultural markets– USA, Europe, Canada, Australia, and Japan separately in addition to estimating overall GSP effect of all GSP programs. The result is presented in table 3.7.

As we see, in the first column where I estimate the market accessibility for GSP countries without distinguishing the GSP provider, the interaction term is not statistically significant. This implies that change in export from GSP recipient countries is not significantly different from non-recipient countries as the exponential relative preference margin changes. I suspect lumping all the GSP programs together has masked the true effect. Focusing on individual GSP providers, we see that the interaction of GSP with the ERPM produces statistically significant results in all cases suggesting that relative tariff preferences matter in shaping imports into these nations. The only exception is the United States. Although extensive the US GSP program is non-discriminatory in that all the countries receiving the references receive same level of tariff reduction, which reduces the preference variability across exporters.The additional benefit for the least developed country group comes from the preferences on additional products and not in terms of additional tariff concession. Therefore the exporter and product dummies might have absorbed most of the variability in the data and thus returning a coefficient that is statistically non-significant. The specification for EU, Japan, and Canada, also includes both exporter and product fixed effects along with time dummies. In these cases, the ERPM coefficients are positive and statistically significant. The interpretation of this interaction coefficient is as follows: a one percent increase in the ERPM score for GSP receiving low income countries increases their exports to the EU by 0.9 percent compared to non-GSP beneficiaries. In the case of Japan, the additional increase in exports is 1.34 percent. Turning to the case of Canada, one percentage increase in the relative preference margin increases the exports to the Canadian agricultural market by nearly four percentage points! This important result is much higher compared to the other major importers likely reflecting the fact that the Canadian market offers widely different preferential tariff rates to its competing suppliers. Finally, the same one-percent increase in the ERPM actually lowers the exports to Australia. One plausible explanation is that the Australian GSP program offerred tariff concession only to the least developed countries[19] and in addition these concessions are based on a flat rate to all the beneficiary countries.

[19]During the sampling period Australia provided preference to 56 countries that consisted of specified least developed and south pacific island territories(UNCTAD 2000)

Assessing the Relative Market accessibility of the GSP Program by Sector

As mentioned above, the GSP preference varies across sectors and countries, and thus is expected to produce different market accessibility conditions across sectors as well as countries. While informative, the above results do not show which sectors are most affected by the GSP program in terms of market accessibility. In table 3.8, I present results from a more flexible specification where GSP dummy variable is interacted with the log (1+ERPM) for a given sector. Therefore, for one GSP providers and 15 sectors a total of 15 different regressions are run separately. These sector specific estimates are also derived for 5 major agricultural markets as in previous analysis. Equation 3.11 is used for this purpose. A limitation associated with this specification is that it results in loss of degrees of freedom implying some loss in precision of the reported coefficients. Considering space and readability of the table, I present only the interaction variable where we read across rows for sector and across columns for the market. The first column includes all the countries while rest of the columns are country specific. Furthermore, the first column includes country specific, and time dummies and the country-specific regressions include only the exporter specific and time dummies to control for unobserved heterogeneities.

The results in table 3.8 indicate that there is considerable heterogeneity across sectors and countries. For comparisons, sector level results is provided with all countries included in the first column. If we look by sectors, we see that the estimated coefficient for sector-ERPM interaction term is significant for 11 out of 14 sectors and is positive in 10 of these instances. However, few sectors are significant and of them very few are with positive sign for an any given country. Here, discussion is limited to the sectors resulting in significant and positive GSP effect. For example, increasing the preferential margin in *Live Animals* increases exports from GSP recipient countries to Canada more than proportionally, that is by 91 percent as compared to exports from non-recipients. While an increase in the same preference margin increases the exports of *Edible fruits and nuts* to Australia by 1.1 percent. On the other hand, increasing the preferential margin in *Cereals* raises the exports to European Union also more than proportionally, that is by 2.8 percent. In case of *Dairy products*, increasing the preferential margin by a unit raises the exports to Canada by 62 units and to Australia by 9.4 units. Further, increase in preference margin offered to *Lac gums and resins* drive the exports to Australia and Japan by 8.5 and 10.4 percent respectively. Likewise, preference benefit of additional unit in case of *Oilseeds or medicinal plants* leads to increase in the exports to Canada by 4.5 percent, to EU by 1.08 percent and to Australia by about 5.4 percent. Turning to the sector- *Prepared*

foodstuffs an additional preferential benefit increases exports from GSP countries to the United States by additional 5.4 percent as compared to non-recipients. The increase in exports of *Prepared foodstuffs* to EU is about 6.9 percent and to Australia is about 2.6 percent. These variations in GSP effect across countries and sectors is not unexpected of when we consider the fact that the GSP tariff preferences are offered at product level. Furthermore, each GSP programs include carefully selected list of items that are not eligible for GSP preferences. Thus, these results suggest that while considering the preferential margins offered to competing suppliers is important, it is also equally important to account for the sector level and GSP program level heterogeneity in evaluating the GSP program.

3.8 Summary and Conclusion

The two objectives of this chapter are to develop theoretically consistent indices to measure the margins of tariff preferences, and to re-evaluate the GSP effect by specifically considering all other preferential tariffs. To meet these objectives, first I develop two indices that are theoretically consistent with the economics of trade expenditure function originally developed by Anderson and Neary (1996, 2003). The first index measures tariff restrictions as compared to MFN rate and I call it Exponential Trade Restrictiveness Index (ETRI). The second measures the preference margin of a country relative to its competing suppliers in the given market and is called Exponential Relative Preferential Margin (ERPM). The ETRI plots (fig 3.3) show that the tariff structure in agriculture sector has generally been liberalized, which is consistent with the fact that- at the turn of the century numerous trade agreements have been formed with an aim to increase trade. However, the increase in number of regional trade agreements including GSP programs might have led to the 'preference erosion' of a country because competing suppliers simultaneously receive some form of preference in the export market. The ERPM captures this important effect. For example, figure 3.4 shows that in the US agricultural markets, exporters face similar preferences although the level of the relative preferences has generally increased as compared to the year 2000 (that is higher share of exporters are receiving more favorable preference margins in the US market compared to a decade earlier). This is consistent with the fact that the US has signed FTA with numerous countries during the sample period.

Importantly as well, ERPM directly connects to the general equilibrium concept because it is rooted in the idea that relative prices matter in shaping trade. As we saw in the first-pass gravity derivation above, relative prices enter the equation through expenditure function. Later in step three of the derivation, a pass through equation links this to trade costs. In step four and step seven, I discuss how the ERPM and ETRI taken together, purges the tariff related portions of the multilateral resistance terms in the gravity equation. Then, incorporating ETRI and ERPM into the gravity model enabled me to measure the effect of tariff preferences on trade explicitly. While traditionally these two terms are controlled for using various country-time dummies, I find that a unit increase in the preference margin relative to competing suppliers (estimated as a coefficient on ERPM) increases the exports more than proportionally, that is by 2 to 2.7 percent. Further, a unit increase in preference margin relative to MFN rate increased the exports by 2.9 to 3.7 percent.

Turning to the second objective, traditional methods to assess GSP effect were limited to using dummy variable and did not consider the preferences competing suppliers might have also received in the given market. As it turns out, both relative and direct preference margins are important variables that explain bilateral trade. Therefore, I use these indices along side the GSP variable in a gravity-based framework, and find a positive and significant GSP effect. For example, additional exports from GSP-receiving countries to high-income countries are about 26 to 28 percent. Further, a model including an interaction of GSP dummy variable with the preferential margin was used to specifically assess the relative preferential gains of GSP beneficiaries. I found a high GSP effect on market accessibility to Canada. For example, one unit increase in the relative preference margin compared to competing suppliers increased the exports to the Canadian agricultural market by nearly four percentage points. In case of the United States, this effect is between 1.2 to 3.9 percentages. In terms of dollar values, increase in exponential tariff preferences by one unit as compared to competing suppliers, translates into additional trade worth of $1.2 to 3.8 million. However, these effects vary across sectors and countries. For example, a unit increase in the preference margin increases exports of *Lac, gums and resins* to Australia by a 8.5 percent while to Japan by about ten percent. Further, the same preference increases exports of prepared foodstuffs to US by a five percent while to the European Union by about seven percent. To summarize, preference margins are important considerations in international trade. The GSP program has increased market accessibility for low-income countries' exports through offering preference benefits. As intended the GSP programs have facilitated trade in the agricultural sector.

Table 3.1: HS-6 digit Agricultural Products Classified into 15 Sub-sectors

Animal Products	**Vegetable Products**	**Animal or Vegetable Products**	**Prepared Foodstuffs**
Live animals	Live trees, plants, bulbs,roots,ornamental flowers	Animal or vegetable fats and oils	Prepared foodstuffs
Meat and edible meat offal	Edible vegetables, roots and tubers		(Beverages, spirits
Dairy produce; eggs, honey	Edible fruit and nuts, peel of citrus/melons		and vinegar,
Other products of animal origin	Cofee, tea, and spices		tobacco and substitutes)
	Products of milling industry		
	Lac; gums, resins and other vegetable saps and extracts		
	Vegetable plaiting materials		
	Oil seeds and Oleaginous fruits, medicinal plants, fodder		
	Cereals		

Notes: The above categorization is broadly based on HS-2 classification system. 23 HS-2 agriculture chapters (section I to IV excluding chapter 03 Fish and crustaceans, molluscs and other aquatic invertebrates of section I).
Section IV (chapter 16-24) is grouped into a single sector 'Prepared Food stuffs'. This sector thus contains nine HS -2 chapters as follows.
16 Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates
17 Sugars and sugar confectionery
18 Cocoa and cocoa preparations
19 Preparations of cereals, flour, starch or milk; pastrycooks' products
20 Preparations of vegetables, fruit, nuts or other parts of plants
21 Miscellaneous edible preparations
22 Beverages, spirits and vinegar
23 Residues and waste from the food industries; prepared animal fodder
24 Tobacco and manufactured tobacco substitutes

Table 3.2: List of Countries Used in this Paper

Algeria (DZA)	Guatemala (GTM)	Philippines (PHL)
Argentina (ARG)	Honduras (HND)	Poland (POL)
Australia (AUS)	Hungary (HUN)	Portugal (PRT)
Austria (AUT)	Iceland (ISL)	Republic of Korea (KOR)
Bangladesh (BGD)	India (IND)	Romania (ROM)
Belarus (BLR)	Indonesia (IDN)	Russian Federation (RUS)
Belgium (BEL)	Iran (IRN)	Saudi Arabia (SAU)
Benin (BEN)	Ireland (IRL)	Senegal (SEN)
Bolivia (Plurinational State of) (BOL)	Israel (ISR)	Singapore (SGP)
Brazil (BRA)	Italy (ITA)	Slovakia (SVK)
Bulgaria (BGR)	Jamaica (JAM)	Slovenia (SVN)
Cameroon (CMR)	Japan (JPN)	South Africa (ZAF)
Canada (CAN)	Jordan (JOR)	Spain (SPN)
Chile (CHL)	Kazakhstan (KAZ)	Sri Lanka (LKA)
China (CHN)	Kenya (KEN)	Sweden (SWE)
China (Hong Kong SAR) (HKG)	Latvia (LVA)	Switzerland (CHE)
Colombia (COL)	Lebanon (LBN)	Thailand (THA)
Costa Rica (CRI)	Lithuania (LTU)	Togo (TGO)
Croatia (HRV)	Madagascar (MDG)	Trinidad and Tobago (TTO)
Czech Republic (CZE)	Malawi (MWI)	Tunisia (TUN)
CôtedI'voire (CIV)	Malaysia (MYS)	Turkey (TUR)
Denmark (DEN)	Mauritius (MUS)	United States of America (USA)
Egypt (EGY)	Mexico (MEX)	Uganda (UGA)
El Salvador (SLV)	Morocco (MAR)	United Arab Emirates (ARE)
Estonia (EST)	Netherlands (NLD)	United Kingdom (GBR)
Ethiopia (ETF)	New Zealand (NZL)	United Republic of Tanzania (TZA)
Finland (FIN)	Nicaragua (NIC)	Uruguay (URY)
France (FRA)	Nigeria (NGA)	Venezuela (VEN)
Gabon (GAB)	Norway (NOR)	Zambia (ZMB)
Germany (DEU)	Oman (OMN)	Zimbabwe (ZWE)
Ghana (GHA)	Paraguay (PRY)	
Greece (GRC)	Peru (PER)	

Table 3.3: Agricultural Export Statistics

Year	Number of Countries Exported To	Number of Products Exported	Total Trade in Agriculture Sector			
			Mean	Std. Dev.	Minimum	Maximum
2000	35	602	$75	$399	$19	$10,100
2001	42	611	$67	$373	$5	$9,010
2002	36	584	$77	$399	$8	$8,050
2003	38	565	$87	$451	$1	$8,710
2004	37	559	$103	$505	$4	$9,790
2005	39	566	$107	$515	$2	$9,960
2006	39	561	$113	$558	$1	$11,100
2007	41	557	$130	$600	$1	$12,800
2008	42	535	$145	$727	$4	$15,000
2009	52	535	$128	$642	$1	$14,300

Notes: Total Trade is in millions of US Dollars.

Table 3.4: Summary Statistics

Variables		Mean	Std. Dev.	Min	Max	Observations
Trade flows	overall	1.42E+07	1.09E+08	1	9.27E+09	N= 252941
	between		9.58E+07	1	9.27E+09	n=46191
	within		3.20E+07	-1.73E+09	2.75E+09	T=10
GSP recipients' exports	overall	9819303	8.27E+07	1	5.54E+09	N=85367
	between		6.16E+07	1	3.33E+09	n=13867
	within		2.69E+07	-1.37E+09	2.22E+09	T=10
GSP	overall	0.3374977	0.4728571	0	1	N= 252941
	between		0.4578344	0	1	n=46191
	within		0.0145497	-0.5625023	1.137498	T=10
GDP of importer	overall	1.23E+12	2.49E+12	5.29E+09	1.47E+13	N= 252941
	between		2.15E+12	5.29E+09	1.47E+13	n=46191
	within		3.86E+11	-1.96E+12	4.29E+12	T=10
GDP of exporter	overall	8.13E+11	1.98E+12	1.29E+09	1.47E+13	N= 252941
	between		1.86E+12	1.29E+09	1.47E+13	n=46191
	within		3.46E+11	-2.11E+12	3.62E+12	T=10
logETRI	overall	0.0475059	0.13048	0	1.313262	N= 252941
	between		0.1466998	0	1.313262	n=46191
	within		0.0612542	-0.9409894	1.221088	T=10
logERPM	overall	0.0437704	0.1647533	0	1.313262	N= 252941
	between		0.1691458	0	1.313262	n=46191
	within		0.0804689	-1.105246	1.217391	T=10
Live Animals*	overall	0.0130199	0.0746146	0	1.313262	N= 6819
	between		0.0962591	0	1.313262	n=1946
	within		0.0321883	-0.7420392	0.5936839	T=10
Animal orVegetable fats and oils*	overall	0.0190277	0.09385	0	1.313262	N=17778
	between		0.1107289	0	1.313262	n=3281
	within		0.0522677	-0.6455858	0.9950722	T=10
Cofee, tea, and spices*	overall	0.1251383	0.2926052	0	1.313262	N= 252941
	between		0.2746869	0	1.313262	n=4074
	within		0.1215166	-0.9784766	1.219523	T=10
Edible fruits and nuts*	overall	0.0266539	0.1190536	0	1.313262	N= 22879
	between		0.1477588	0	1.313262	n=3821
	within		0.0709991	-1.062371	1.200275	T=10
Edible vegetables*	overall	236726	0.1115494	0	1.313262	N= 20843
	between		0.0368583	0	1.313262	n=3607
	within		0.0173975	-0.7624146	1.104038	T=10
Live plants and roots*	overall	0.0263598	0.1212697	0	1.313262	N= 16374
	between		0.1341784	0	1.313262	n=2975
	within		0.0643177	-0.9897967	1.030115	T=10
Cereals*	overall	0.0308151	0.1322214	0	1.313262	N=12372
	between		0.1615856	0	1.313262	n=2583
	within		0.0786205	-0.6714596	1.181664	T=10
Dairy products*	overall	0.0105597	0.0724475	0	1.313262	N= 15849
	between		0.0995755	0	1.313262	n=3130
	within		0.0341156	-0.6460697	0.9769414	T=10
Lac and gums*	overall	0.0267604	0.1102732	0	1.313262	N= 15715
	between		0.1196362	0	1.313262	n=2934
	within		0.0556473	-0.8265974	0.7938689	T=10
Meat and edible meat offal*	overall	0.0172433	0.091081	0	1.313262	N= 10843
	between		0.0987068	0	1.313262	n=2142
	within		0.0403838	-0.8144016	0.6934364	T=10
Oil-seeds or medicinal plants*	overall	0.0512613	0.1652448	0	1.313262	N= 22086
	between		0.0602705	0	1.313262	n=3815
	within		0.0239753	-0.9641824	0.9847178	T=10
Product of milling industry*	overall	0.0151586	0.0906018	0	1.313262	N=14104
	between		0.1126885	0	1.313262	n=2766
	within		0.0526988	-0.9227345	1.134966	T=10
Other products of animal origin not included elsewhere*	overall	0.0020268	0.0320713	0	1.313262	N= 14020
	between		0.1475478	0	1.313262	n=2522
	within		0.0634652	-0.6833254	0.9180104	T=10
Prepared food stuffs*	overall	0.0118649	0.091338	0	1.313262	N= 252941
	between		0.0861396	0	1.313262	n=46191
	within		0.0469051	-1.137151	1.146006	T=10

Notes: *The reported statistic is Log of (1+ERPM) for a given sector.

Table 3.5: The Effect of Direct and Relative Preferential Margins on Trade

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	All Years Included		Only Year 2000		Only year 2009	
Log of GDP of exporter	0.47***	0.47***	0.51***	0.58***	0.36***	0.44***
	(0.12)	(0.12)	(0.07)	(0.07)	(0.07)	(0.10)
Log of GDP of importer	1.07***	1.06***	0.59***	0.67***	0.70***	0.74***
	(0.23)	(0.23)	(0.04)	(0.03)	(0.06)	(0.03)
Log (1+ETRI)	2.90***		3.72***		3.56***	
	(0.11)		(0.26)		(0.26)	
Log(1+ERPM)		2.08***		2.32***		2.70***
		(0.06)		(0.09)		(0.17)
Observations	208,441	208,441	21,969	18,730	31,194	23,151
Pseudo log-likelihood	-3.467e+12	3.457e+12	-2.142e+11	-5.633e+11	-5.651e+11	-5.591e+11
R-sq.	0.33	0.33	0.36	0.36	0.27	0.27
Importer FE	Yes	Yes	Yes	Yes	Yes	Yes
Exporter FE	Yes	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	No	No	No

Notes: ***, **, * denote significance at 1%, 5% and 10% level, respectively. All the standard errors reported in parenthesis are robust (clustered by country pair specific ids). PPML estimators are used, Specification 3.28 is used.

Table 3.6: The GSP Effect on Trade

VARIABLES	(1)	(2)	(3)	(4)
Both in WTO	0.455***	0.738***	0.682***	0.724***
	(0.165)	(0.157)	(0.162)	(0.158)
Importer in WTO	-0.533**	-0.830***	-0.756***	-0.816***
	(0.232)	(0.224)	(0.225)	(0.224)
Exporter in WTO	-0.449**	-0.710***	-0.665***	-0.698***
	(0.220)	(0.215)	(0.219)	(0.215)
GSP	0.248***	0.233***	0.231***	0.231***
	(0.063)	(0.063)	(0.063)	(0.062)
Log(1+ETRI)		3.475***		3.202***
		(0.111)		(0.172)
Log(1+ERPM)			2.438***	0.303**
			(0.063)	(0.122)
Common RTA	0.779***	0.804***	0.793***	0.804***
	(0.032)	(0.032)	(0.032)	(0.032)
Log of GDP of exporter	0.257***	0.279***	0.284***	0.280***
	(0.099)	(0.099)	(0.099)	(0.099)
Log of GDP of importer	0.841***	0.882***	0.865***	0.882***
	(0.173)	(0.172)	(0.172)	(0.172)
Log of real exchange rate	-0.247	-0.284	-0.266	-0.282
	(0.268)	(0.266)	(0.267)	(0.266)
Contiguity	0.866***	0.839***	0.841***	0.838***
	(0.038)	(0.038)	(0.038)	(0.038)
Colonial relationship post 1945	1.033***	1.283***	1.221***	1.286***
	(0.088)	(0.090)	(0.089)	(0.090)
Common colonizer	0.310*	0.330*	0.302*	0.329*
	(0.174)	(0.171)	(0.167)	(0.170)
Common official language	0.252***	0.272***	0.271***	0.273***
	(0.037)	(0.037)	(0.037)	(0.037)
Log of distance	-0.459***	-0.477***	-0.472***	-0.477***
	(0.017)	(0.017)	(0.017)	(0.017)
Log of area of importer	0.074	0.080	0.091	0.081
	(0.063)	(0.063)	(0.063)	(0.063)
log of area of exporter	-0.400***	-0.535***	-0.454***	-0.528***
	(0.035)	(0.037)	(0.036)	(0.036)
Observations	208,441	208,441	208,441	208,441
R-squared	0.604	0.607	0.606	0.607
Pseudo-loglikelihood	-2.410e+12	-2.326e+12	-2.356e+12	-2.326e+12
Product FE	Yes	Yes	Yes	Yes
Importer FE	Yes	Yes	Yes	Yes
Exporter FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: ***, **, * denote significance at 1%, 5% and 10% level, respectively. All the standard errors reported in parenthesis are robust (clustered by country pair specific ids). PPML estimators are used.

Table 3.7: The GSP Effect of Major Industrial Countries

Variables	All Markets	USA	EU	Japan	Canada	Australia
GSP	0.002	-9.56***	0.83***	0.31***	-18.88***	1.68
	(0.08)	(1.16)	(0.09)	(0.12)	(1.36)	(1.19)
Log(1+ERPM)	2.17***	7.6***	-0.21	-0.02	5.97***	4.73***
	(0.08)	(0.81)	(0.37)	(0.43)	(0.85)	(0.31)
GSP*Log(1+ERPM)	-0.01	1.21	0.90***	1.34***	3.92***	-2.43***
	(0.09)	(1.01)	(0.34)	(0.51)	(1.21)	(0.59)
R-sq	0.1	0.81	0.85	0.58	0.99	0.85
Pseudo-loglikelihood	-4.038e+12	-1.983e+11	-1.064e+12	-2.467e+11	-2.760e+10	-1.219e+10
Observations	208441	9422	87167	7288	8973	6467
Importer FE	Yes	No	No	No	No	No
Exporter FE	Yes	Yes	Yes	Yes	Yes	No
Product FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: ***, **, * denote significance at 1%, 5% and 10% level, respectively. All the standard errors reported in parenthesis are robust (clustered by country pair specific ids). PPML estimators are used. Specification 3.29 is used.

Table 3.8: GSP and the Relative Market Accessibility across Sectors

Sectors	All countries (1)	USA (2)	Canada (3)	EU (4)	Australia (5)	Japan (6)
Live animals	-0.595	20.343	91.103***	-0.338	63.708	-18.048***
	(1.194)	(28.536)	(25.8777)	(0.757)	(173.953)	(2.966)
Animal or vegetable fats and oils	-1.397	-1.105	-6.728	-0.935	-19.517	-0.535
	(0.728)	(1.168)	(4.286)	(0.723)	(39.547)	(1.131)
Cofee ,tea, and spices	-0.104	-4.368*	-11.634	-2.792***	-1.280**	-28.738***
	(0.250)	(1.693)	(8.680)	(0.616)	(0.520)	(3.439)
Edible fruits and nuts	1.892***	2.940	-3.837	-0.489	1.110**	9.302
	(0.551)	(1.261)	(3.457)	(0.875)	(0.532)	(23.163)
Edible vegetables	-2.111***	1.398	-61.116	-1.067	-7.600***	14.768***
	(0.637)	(4.106)	(27.889)	(0.691)	(2.950)	(4.922)
Live plants and roots	-2.299***	4.483	2.051	-4.143**	-2.052	-12.8313***
	(0.700)	(3.593)	(4.967)	(1.698)	(2.177)	(2.803)
Cereals	1.433	1.536	1.175	2.785**	-1.530	-5.269
	(0.927)	(1.513)	(0.969)	(1.349)	(2.714)	(3.997)
Dairy products	1.676*	8.131	62.407***	-6.403	9.370**	-3.296
	(0.894)	(39.410)	(18.761)	(4.871)	(3.805)	(4.174)
Lac, gums and resins	-0.156	2.443	-7.186	-0.720	8.540***	10.166***
	(0.415)	(3.657)	(6.436)	(0.557)	(1.889)	(2.725)
Meat and edible meat offal	-16.406***	-10.041	8.224**	-1.169	0.453	1.237
	(5.339)	(10.984)	(4.135)	(1.915)	(1.143)	(2.760)
Oilseeds or medicinal plants	0.697*	-2.409	4.554*	1.08*	5.376***	-50.511***
	(0.314)	(2.089)	(2.460)	(0.565)	(1.668)	(8.696)
product of milling industry	-1.244**	0.893	-26.365***	0.116	-0.019	-0.893
	(0.544)	(2.504)	(6.081)	(0.735)	(1.935)	(2.855)
other products of animal origin	1.290**	-1.690	2.049	1.361*	-9.715	-2.706
	(0.477)	(2.285)	7.600	(0.713)	(7.277)	(1.670)
Prepared food-stuffs	0.763**	5.440**	1.711	6.903***	2.627***	-20.990***
	(0.346)	(2.299)	1.512	(1.862)	(0.906)	(4.755)

Notes: This table reports interaction of GSP with log(1+ERPM) for the given sector. PPML estimates are used. All the standard errors reported in parenthesis are robust (clustered by country pair specific ids). ***, **, * denote significance at 1%, 5% and 10% level, respectively. All the estimates reported are from sub-sample regression for a given sector. Specification 3.30 is used. Columns 2 to 6 does not include Log GDP of importer. Further column 2 to 6 includes Log of distance and does not use Log(1+ETRI) as it resulted in a singular variance-covariance matrix in some cases. The first column includes all countries, while the other columns contain results country-wise.

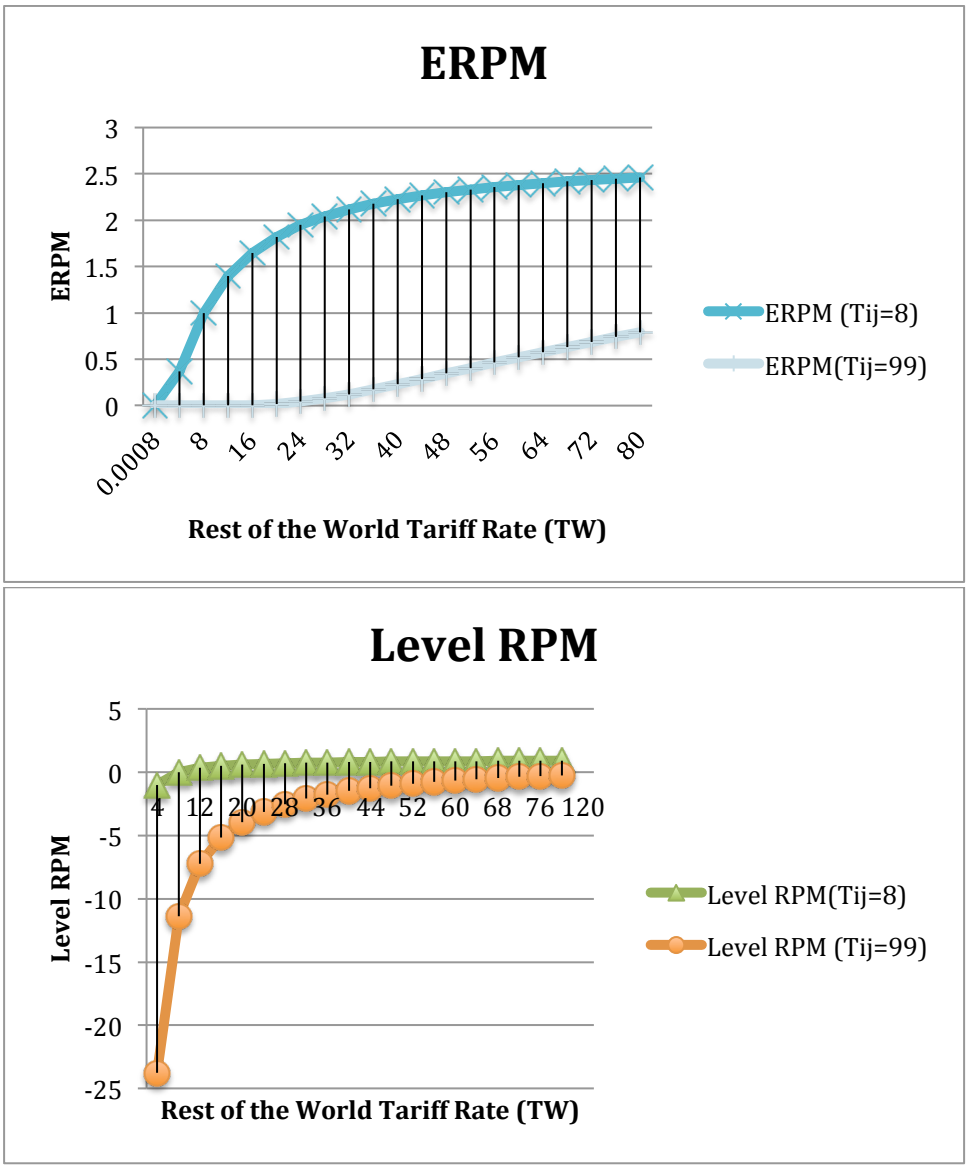

Figure 3.1: Nature of the Exponential and Level Relative Preferential Margin

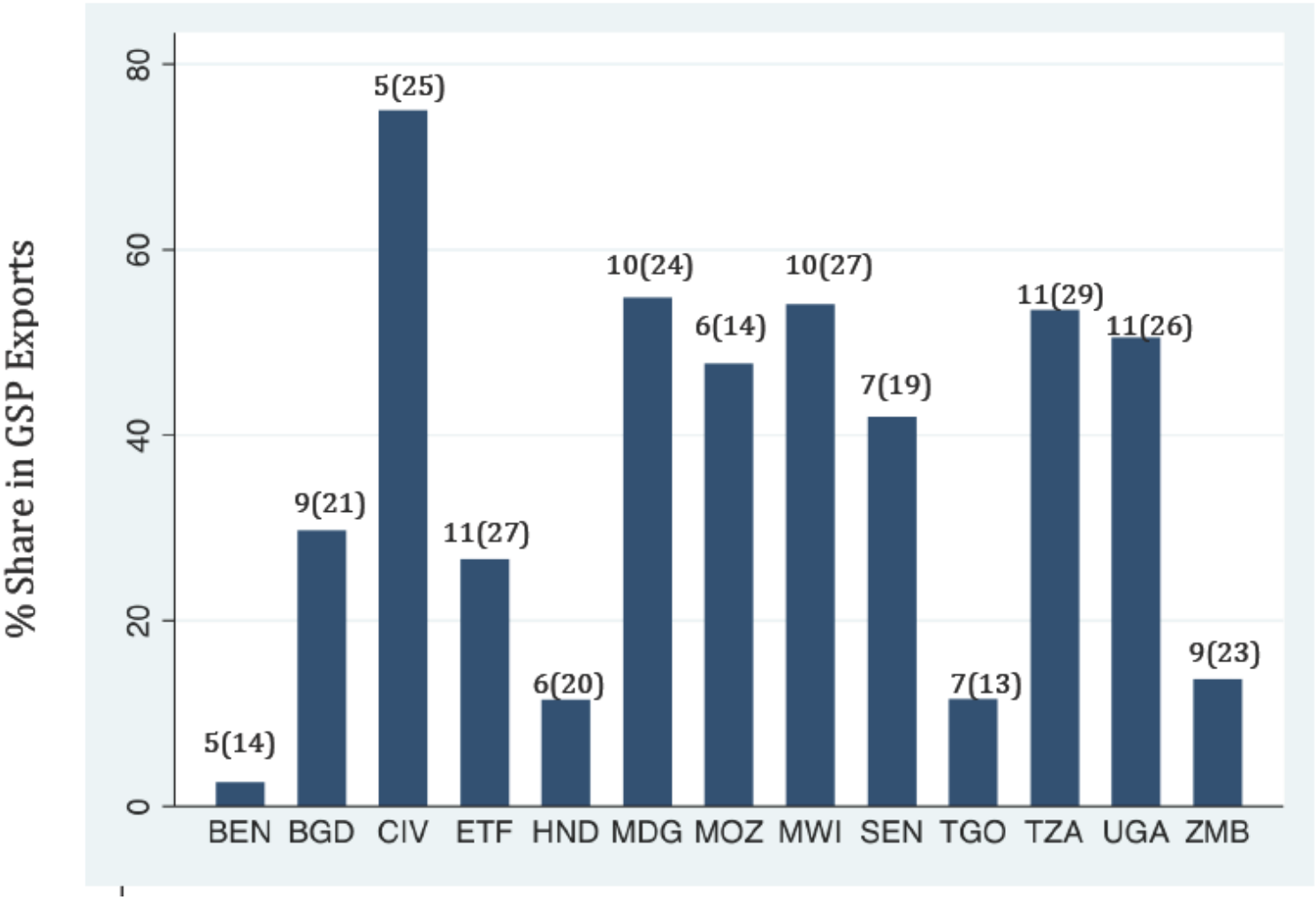

Figure 3.2: Percentage Share of GSP Exports in Total Agricultural Exports for Least Developing Countries in the year 2009.

Figure 3.3: Distribution of ERPM as Faced by Suppliers in Major Agricultural Markets in 2000 vs 2009.

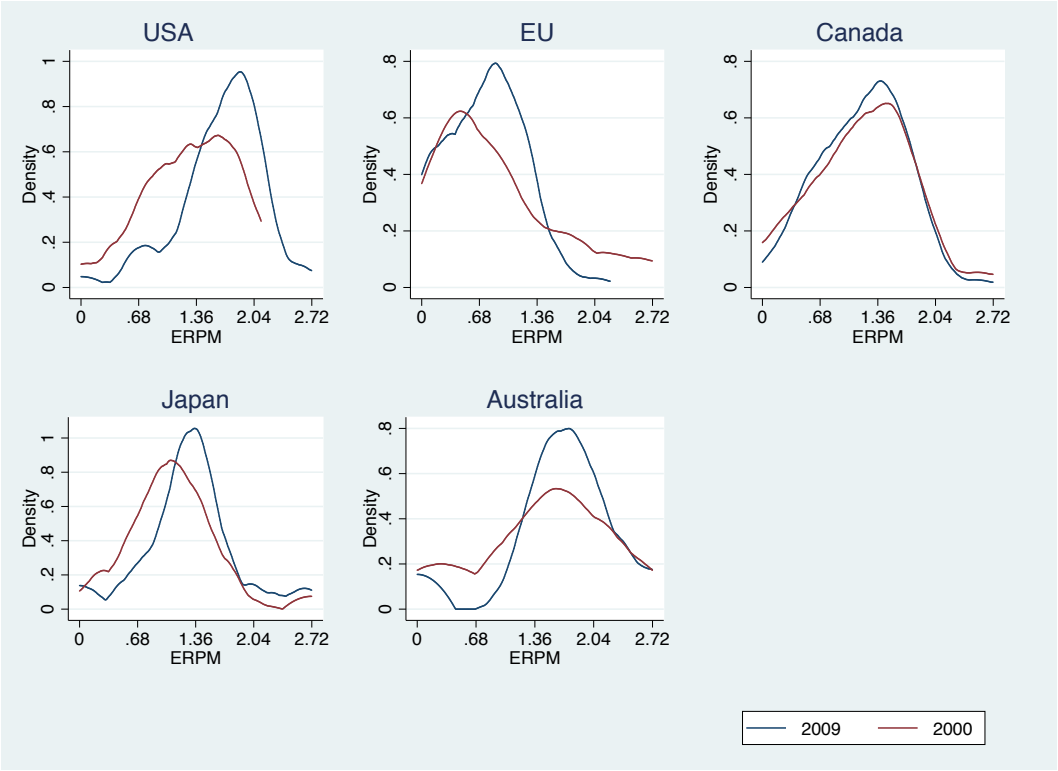

Figure 3.4: Distribution of ERPM as Faced by Suppliers in Major Agricultural Markets in 2000 vs 2009.

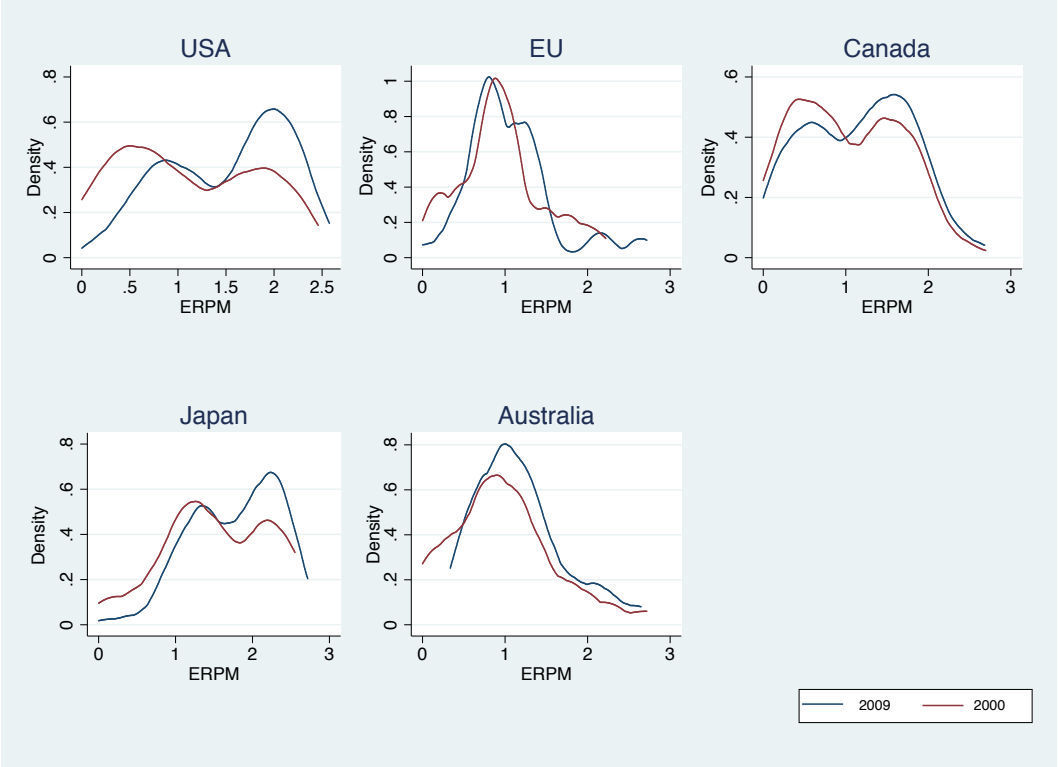

Figure 3.5: Distribution of ERPM as Faced by Suppliers in Major Agricultural Markets in 2000 vs 2009.

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