The Discriminatory Nature of Specific Tariffs

Sohini Chowdhury

This paper quantifies the distortions from specific tariffs levied by the EU. The most-favored-nation (MFN) specific tariffs levied by the EU translate into higher tariff barriers for poor countries exporting low price goods. We show that for poor countries, these higher tariff barriers from specific tariffs offset the gains from preferential tariffs. We apply a two-stage analysis to show that the specific tariffs levied by the EU on its agricultural imports wash away more than half of the welfare benefits enjoyed by the Sub-Saharan African countries from EU preferential tariffs. Our results provide the first quantitative estimate of the distortions associated with specific tariffs.

JEL codes: F13, F14, O12, Q17

The most-favored-nation (MFN) clause, a key feature of the WTO agreement, requires that each WTO member treat its trading partners equally by levying a common MFN tariff on every imported tariff line. But while a MFN specific tariff (e.g. $2 per ton) conforms to this non-discrimination principle in paper, it violates this principle in spirit. In fact, specific tariffs discriminate against imports from poor countries. We can identify two channels for this. First, poor countries tend to have lower export prices compared to rich countries (Schott, 2004); this means that when poor and rich exporters face the same level of specific tariff, poor exporters face a higher ad valorem equivalent (AVE).

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1. Schott (2004) analyzed US manufacturing imports for the year 2001 and found a significant positive correlation between the per capita GDP of exporters and the unit value of their exports. He concluded that rich countries utilize their comparative advantage in skill and capital to supply higher quality and higher priced varieties. Abd-El-Rahman (1991) shows that unit value differences reveal quality differences, even at the detailed ten-digit HS level. Fontagné et al. (1997) and Greenaway et al. (2001) show that vertical specialization is among the most salient features of trade between European countries.

2. The AVE of a specific tariff expresses the specific tariff on a commodity as a percentage of the price of the commodity. This means that the same specific tariff of $2/ton on rice translates into a higher AVE, say 50%, for rice imported from Bangladesh and a lower tariff equivalent, say 10%, for rice imported from Japan.

This effect is seen with any per-unit specific price rise, arising either from an unit transport cost (Alchian and Allen, 1964; Hummels and Skiba, 2004) or from an import quota (Falvey, 1979; Boorstein and Feenstra, 1987).
Second, specific tariffs are concentrated on agricultural commodities\(^3\) which form the bulk of poor country’s exports (Gibson et al., 2001;\(^4\) Hoekman et al., 2002). Our initial data analysis shows that in 2004, nearly half (48\%) of the global agricultural imports were sourced from poor countries. While the discriminatory effects of specific tariffs have been discussed in the literature (Gibson et al., 2001; Von Kirchbach and Mondher, 2003; Bouët et al., 2004), there has been no quantitative estimate of the welfare loss faced by poor countries from such tariffs. In this paper we provide an estimate of the additional welfare loss from specific tariffs, vis-à-vis ad valorem tariffs, accruing to poor countries. Additionally, to get a better sense of the size of this loss, we express the loss as a percentage of the welfare gain enjoyed by poor countries from the tariff preferences granted to them by rich countries. Article XXIV of the GATT/WTO together with the Enabling Clause,\(^5\) permit exemptions to the MFN obligation and create a legal basis for the formation of Preferential Trade Agreements. These PTAs can be bilateral/reciprocal tariff preferences like Free Trade Agreements or Customs Unions, or unilateral/non-reciprocal tariff preferences extended from developed to developing countries like the Generalized System of Preferences (GSP), and its extensions like the Everything but Arms (EBA)\(^6\) initiative by the EU and the African Growth and Opportunities Act (AGOA)\(^7\) by the US.

Results show that more than half the welfare gains enjoyed by the Sub-Saharan\(^8\) countries (SSA) from the preferences granted to them by the EU are taken away by the specific tariffs levied by the EU. In other words, while on one hand the EU grants preferences to poor countries through lower tariff rates, on the other hand it takes away the benefits of these preferences through specific tariffs.

To arrive at our results, we use a partial equilibrium model considering only the preferential and specific tariffs levied by the EU on its agricultural imports from Sub-Saharan Africa. We follow a two-stage procedure, sequentially eliminating preferential tariffs and specific tariffs by the EU. In Stage 1, we eliminate

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3. Our analysis in Section I shows that specific tariffs were concentrated on agricultural imports whether analyzed in terms of the number of tariff lines, the tariff rates, or the AVEs.

4. Gibson et al. (2001) states that approximately 44\% of agricultural tariff-lines in the US and EU are specified in non-ad valorem terms. The reasons include the increased protection that a non-ad valorem tax provides against large drops in import prices and the lack of transparency associated with these rates, which helps conceal the level of protection.

5. Decision on Differential and More Favourable Treatment, Reciprocity, and Fuller Participation of Developing Countries, GATT Document L/4903, 28 November 1979, BISD 26S/203

6. This initiative came into effect in 2001. Under this, the EU grants duty free access to imports of all products that originate in LDCs with the exception of arms and munitions.

7. This act came into effect in 2000. Under this the US extended preferences to 37 African countries, providing duty free access to agricultural commodities.

8. EU includes the 25 member countries of the European Union in 2004. SSA includes 50 countries (all of Africa – South Africa – a few small dependencies – the six North African countries of West Sahara, Morocco, Algeria, Libya, Tunisia and Egypt).
preferential tariffs by moving from the preferential tariff schedule to the MFN tariff schedule. In Stage 2, we eliminate specific tariffs by moving from the MFN tariff schedule to the mean ad valorem equivalent tariff schedule, where the mean is taken over all exporters for each importer-commodity pair. We then compare the welfare losses from each stage.

There is a large literature that analyzes the welfare gains/losses from trade agreements. In comparison, our paper disentangles the effects of specific tariffs and trade agreements and compares the welfare loss from specific tariffs to the welfare gains from preferential tariffs. There is also a large literature that calculates the distortions from tariffs. In comparison, our paper calculates the additional distortion from specific tariffs vis-à-vis ad valorem tariffs. We define the mean ad valorem tariff equivalent as a benchmark to calculate the additional loss from specific tariffs.

The rest of our paper is organized as follows: We present some preliminary data analysis in Section I and discuss the general research methodology in Section II. Sections III and IV describe the model and data, and the results are analyzed in Section V. Section VI presents some robustness checks and Section VII concludes.

I. PRELIMINARY DATA ANALYSIS

We use trade and tariff data for the year 2004 from the Comtrade and MACMapHS6v2.02 databases respectively. The data sources are discussed in details in Section IV. Figure 1 shows that globally, specific tariffs are concentrated in the trade of agricultural commodities. 11% of all bilateral tariff lines in agriculture face specific tariffs, compared to only 1.6% of the bilateral tariff lines in non-agriculture and 2.4% of all bilateral tariff lines. In terms of the number of tariff lines, 65% of all the bilateral tariff lines facing specific tariffs are agricultural commodities. In terms of tariff rates, 67% of the value of all bilateral specific tariff rates (in $ per ton) are on agricultural commodities. Based on these data analyses, the rest of our paper will focus on specific tariffs on agricultural imports alone. The data identifies Iceland, Vanatua, Switzerland and Norway as countries with high specific tariffs on their agricultural imports; and Kenya, Vietnam, Kazakhstan and Uzbekistan as countries facing high ad valorem equivalents of specific tariffs on their agricultural imports.

9. These studies are either in a partial equilibrium framework using some variant of the gravity equation (Baier et al., 2007; Carrere, 2006) or in a general equilibrium framework (Bouet and Laborde, 2009; Anderson et al., 2006, Francois et al., 2005).


11. Boorstein and Feenstra (1987) do something similar when they calculate the ‘excess cost’ of the US steel import quotas during 1969–74. They define as the benchmark the ad valorem tariff which has the same effect on aggregate import price as the quota.
exports. Figure 2 shows that poor exporters, on average, face higher ad valorem equivalents of specific tariffs.

We check this claim further by testing, similar to Schott (2004), the relationship between an exporter’s per capita GDP and the unit values of its exports. Figure 2 shows that poor exporters, on average, face higher ad valorem equivalents of specific tariffs.

Notes: The AVEs corresponding to each HS2 is obtained by taking a simple average over all tariff lines for all importers, within each HS2. HS Chapter: 06 is ‘live trees & plants’; HS Chapter: 24 is ‘tobacco’; HS Chapter: 01-24 are agricultural commodities.

Source: Authors’ analysis based on data sources discussed in the text.

Exports. Figure 2 shows that poor exporters, on average, face higher ad valorem equivalents of specific tariffs.

Notes: Kenya (KEN), Kazakhstan (KGZ), Uzbekistan (UZB), Vietnam (VNM), Papua New Guinea (PNG), Mongolia (MNG).

Source: Authors’ analysis based on data sources discussed in the text.
agricultural exports. We estimate the following regression pooling across all exporters \((j)\) and all importers \((i)\), for all agricultural goods \((k)\) (HS Chapter \(\leq 24\)), with HS6 commodity fixed effects

\[
\ln uv_{ijk} = \alpha_{ik} + \beta \ln \left( \frac{GDP}{L} \right)_j + \xi_{ik} \tag{1}
\]

where, \(\alpha_{ik}\) is the importer-by-commodity fixed effect, \(uv_{ijk}\) is the unit value of good \(k\) imported into \(i\) from \(j\), \((GDP/L)_j\) is the per capita GDP of exporter \(j\) and \(\xi_{ik}\) is the error term. For unit values, we use the Exporter Reference Group Unit Values (ERGUVs), which are computed as the weighted median unit value of worldwide exports from an exporter’s reference group (Bouët et al., 2004). Our estimation results, presented in Table 1, suggest that on average, doubling the per capita GDP of exporters increases the ERGUVs of their exports by 7.7%. The significant positive correlation between the exporter’s unit value and per capita GDP corroborates the claim that on average, the ad valorem equivalents of MFN specific tariffs are higher for poor country exporters. It is this feature of specific tariffs that bias them against poor exporters.

II. RESEARCH METHODOLOGY

While specific tariffs increase the effective tariff rates faced by poor exporters, preferential tariffs lower these rates by granting poor exporters tax concessions. So the welfare losses faced by poor exporters from specific tariffs can be analyzed only if we control for the welfare gains from the preferential tariffs they face. We use a two-stage experiment to disentangle these two effects. In Stage 1, we eliminate preferential tariffs by removing all preferences granted by rich importers in agriculture. This is achieved by moving from the rich importer’s preferential tariff rates (which we denote by \(tp\)) to their MFN tariff rates.

12. Bouët et al. (2004) assign each reporting country to a reference group of similar countries using a hierarchical clustering analysis based on GDP per capita (in terms of PPP) and trade openness. They label the five resulting groups as: (1) richest countries; (2) high openness, middle income countries; (3) low openness, middle income countries; (4) high openness, low income countries; (5) low openness, low income countries. The full set of countries and reference groups is provided in Appendix A1 of their paper. They calculate ERGUVs using "weighted" medians assuming that each UV repeats as many times as the underlying trade flow contains dollars. For robustness, the UVs are computed based on three-year-average trade flows (across the 2000–2002 period). Outliers are filtered by truncating to the top or bottom limit, any ratio of ERGUVs to the world median unit value which fall outside the bracket \([1/3; 3]\). A sequential procedure is used to fill missing values for reference groups: any blank is substituted by the value of the closest reference group.

13. This is especially relevant given the recent proliferation of PTAs. In 2008, there were over 350 PTAs (Bhagwati, 2008) suggesting that the rich countries now grant MFN tariffs to only a handful of countries. The EU applies its MFN tariffs to only six countries – Australia, New Zealand, Canada, Japan, Taiwan and the US – with all other countries enjoying more favorable tariffs. This has prompted Bhagwati to suggest that the MFN tariff should be more appropriately renamed as the LFN (Least Favored Nation) tariff (Bhagwati, 2008).
Now while the MFN tariff rates are the same for all exporters corresponding to each rich importer-commodity pair, their ad valorem equivalents (which we denote by \( t_m \)) are not, since these MFN rates also include specific tariffs. In Stage 2 therefore, we convert the specific tariffs levied by rich importers on agriculture to ad valorem tariffs. This is achieved by moving from the ad valorem equivalents of MFN tariff rates (\( t_m \)) to the mean ad valorem equivalents across all exporters (which we denote by \( t_c \)). The counterfactual mean ad valorem tariff \( t_c \) is truly MFN since it is uniform across exporters for each importer-commodity pair. We construct \( t_c \) for each importer-commodity pair according to Equation 18, as the average ad valorem equivalent faced by all exporters, weighted by the product of the price elasticity of import demand and free-trade imports, following Leamer (1974). We clarify the intuition behind \( t_p \), \( t_m \) and \( t_c \) in Table 2. The table shows the ad valorem equivalents of tariffs levied by Switzerland on its import of raw cane sugar from Japan and Guatemala. \( t_p \) denotes the actual tariffs levied and includes both preferential and specific tariffs. Due to the preferential tariff benefits enjoyed by the poor country Guatemala, it faces a lower (in this case, a zero) \( t_p \) than Japan. \( t_m \) is the ad valorem equivalent of the MFN tariff rates levied by Switzerland and does not include preferential tariffs. Although the MFN tariff rates are identical across exporters, their ad valorem equivalents (\( t_m \)) are not, due to the presence of specific tariffs. In particular, due to the lower price of Guatemala exports, Guatemala faces a higher \( t_m \) than Japan. To even out the non-MFN effects of specific tariffs across Guatemala and Japan, we construct the counterfactual tariff \( t_c \) as the mean ad valorem tariff equivalent across all exporters. Having |

**Table 1. Regression of Unit Values on Exporter Per Capita GDP**

<table>
<thead>
<tr>
<th></th>
<th>( \ln(p_1) )</th>
<th>( \ln(p_2) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln(\text{GDP/L}) )</td>
<td>0.077** (0.002)</td>
<td>0.121 (0.061)</td>
</tr>
<tr>
<td>( N )</td>
<td>229640</td>
<td>229640</td>
</tr>
</tbody>
</table>

*Source:* Authors’ analysis based on data sources discussed in the text.

\( p_1 = \text{ERGUV}; \; p_2 = \text{bilateral unit value.} \; **p < 0.01

**Table 2. An Illustration of the 2-Stage Procedure**

<table>
<thead>
<tr>
<th>Exporter</th>
<th>( t_p )</th>
<th>( t_m )</th>
<th>( t_c )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guatemala</td>
<td>0.00</td>
<td>2.28</td>
<td>0.33</td>
</tr>
<tr>
<td>Japan</td>
<td>0.10</td>
<td>0.10</td>
<td>0.33</td>
</tr>
</tbody>
</table>

*Source:* Authors’ analysis based on data sources discussed in the text.
been stripped off the effects of specific tariffs, tc is the same across all exporters. Once we have the three tariff schedules tp, tm and tc, we compare the welfare losses corresponding to each. We run both stages of the experiment under a partial equilibrium model which considers only the EU’s tariff policy towards Sub-Saharan Africa.

III. MODEL

We consider a simple world with the EU as the only importer. All countries exporting to the EU are classified as either SSA (Sub-Saharan Africa) or non-SSA. We consider only the trade in agricultural commodities. We select the particular combination of the EU and SSA because our data suggests that on average, EU agricultural imports from SSA face high MFN specific tariffs (31.3%) and are significantly higher ($9.67 billion) than the imports of other rich countries from SSA. Moreover, almost every EU agricultural tariff line imported from SSA benefits from some tariff preference (only 17 out of the 516 tariff lines face no preference). These make the EU and SSA perfect candidates for our model. We use the model to compute the proportion of the benefits enjoyed by SSA from EU preferential tariffs that are taken away by EU specific tariffs.

Consider the import of commodity k from country j into the EU given by

\[ q_{jk} = a_{djk}p_{jk}^{-\sigma_k} \]

Consider the export of commodity k from country j to the EU given by

\[ q_{jk} = a_{sjk}p_{jk}^{S_k} \]

where, \( j \in \{ \text{all exporters} \} \) is the exporter index, \( k \in \{ \text{agricultural tariff lines} \} \) is the commodity index, \( \sigma_k \) is the own price elasticity of import demand of good k in the EU, and \( S_k \) is the own price elasticity of export supply of good k from the rest of the world as faced by the EU. \( a_{djk} \) and \( a_{sjk} \) are shift parameters corresponding to the import demand and export supply curves respectively. From the Comtrade dataset, we obtain data on bilateral c.i.f prices (\( p_{sjk} \)) and import quantities (\( q_{0jk} \)) for the EU. All other prices and quantities are expressed in terms of these values and elasticities.

We illustrate our model in Figure 3, showing the EU’s import demand curve and exporter j’s export supply curve for commodity k.

\( p^* \) is the free-trade world price and \( q^* \) is the corresponding import quantity. An import tariff \( t \) levied by the EU introduces a wedge between the price paid by the domestic consumers and the price received by the foreign supplier by raising the domestic price to \( p_{djk} \) and lowering the world price to \( p_{sjk} \) where

\[ p_{djk} = p_{sjk}(1 + t_{jk}) \]
As Figure 3 shows, the distribution of the tariff incidence between the EU and
the exporter is determined by the import demand and export supply elasticities
$\sigma_k$ and $S_k$. The post-tariff import quantity is $q_0$. The EU faces an allocative
efficiency loss from the import tariff due to the higher domestic price and lower
import, and a terms of trade gain due to the lower price it pays for its import.
So the net welfare loss faced by the EU from the import tariff $t$ is equal to the
allocative efficiency loss it faces net of the terms of trade gain. SSA faces an
allocative efficiency loss due to lower exports, and a terms of trade loss (equiva-
 lent to the terms of trade gain faced by the EU) due to the lower price it
receives on its export. So the net welfare loss faced by SSA from the import
tariff $t$ is equal to the sum of its allocative efficiency loss and terms of trade
loss. It is important to note that all losses are expressed with respect to the free
trade i.e. zero tariff scenario.

The welfare loss in EU and an exporting country $j$, from a tariff $t$ levied by
the EU on commodity $k$ is derived as follows:

From Figure 3, ignoring the subscripts, we have

$$q_0 = a_d p_d^{-\sigma} = a_s p_s^S$$

From (4) and (5), we have

$$a_d p_s^{-\sigma} (1 + t)^{-\sigma} = a_s p_s^S$$

**Figure 3. Welfare Loss**

Source: Authors’ analysis based on model discussed in the text.
Rearranging (6), we have

$$\frac{a_d}{a_s} = (1 + t)^\sigma p_s^{S+\sigma}$$  \hspace{1cm} (7)

From Figure 3 we also have

$$q^* = a_d p^{*-\sigma} = a_s p^*$$  \hspace{1cm} (8)

From (8), we have

$$\frac{a_d}{a_s} = p^{*(S+\sigma)}$$  \hspace{1cm} (9)

Combining (7) and (9), we have

$$(1 + t)^\sigma p_s^{S+\sigma} = p^{*(S+\sigma)}$$  \hspace{1cm} (10)

Rearranging (10), we have

$$p^* = p_s (1 + t)^{\frac{\sigma}{1+\sigma}}$$  \hspace{1cm} (11)

From (11), (8) and (5), we have

$$q^* = q_0 (1 + t)^{\frac{\sigma}{1+\sigma}}$$  \hspace{1cm} (12)

From Figure 3, AE loss in the EU

$$= \int_{q_0}^{q^*} p(q_d) dq - (q^* - q_0) p^*$$

$$= \int_{q_0}^{q^*} \left( \frac{d}{a_d} \right)^{-\frac{1}{\sigma}} dq - (q^* - q_0) p^*$$

$$= (a_d)^{\frac{1}{\sigma}} \left[ q^{\frac{1}{1-\sigma}} - q_0^{\frac{1}{1-\sigma}} \right] - (q^* - q_0) p^*$$

Substituting the values of $q^*$ and $p^*$ from (12) and (11) respectively, we have
AE loss in the EU

\[
\begin{align*}
\frac{\sigma}{\sigma - 1} & \left( q_0 p_d^* \right)^{\frac{1}{\gamma}} \left( q_0^\gamma \right) \left[ (1 + t)^{\frac{s(\sigma-1)}{\sigma(\gamma+\delta)}} - 1 \right] \\
& - q_0 \left[ (1 + t)^{\frac{\sigma \delta}{\sigma \gamma + \delta}} - 1 \right] p_s (1 + t)^{\frac{\sigma}{\sigma \gamma + \delta}} \\
& = \frac{\sigma}{\sigma - 1} p_s (1 + t) q_0 \left[ (1 + t)^{\frac{s(\sigma-1)}{\sigma(\gamma+\delta)}} - 1 \right] \\
& - q_0 p_s (1 + t)^{\frac{\sigma(1 + \delta)}{\sigma(\gamma+\delta)}} + q_0 p_s (1 + t)^{\frac{\sigma}{\gamma+\delta}} \\
& = p_s q_0 \left[ \frac{1}{\sigma - 1}(1 + t)^{\frac{s(1 + \delta)}{\sigma(\gamma+\delta)}} - \frac{\sigma}{\sigma - 1}(1 + t) + (1 + t)^{\frac{\sigma}{\gamma+\delta}} \right] \\
\end{align*}
\]

From Figure 3, AE loss in the exporter \( j \)

\[
= (q^* - q_0) p^* - \int_{q_0}^{q^*} p(q_s) dq \\
= (q^* - q_0) p^* - \int_{q_0}^{q^*} \left( \frac{q_s}{a_s} \right)^{\frac{1}{\gamma}} dq \\
= (q^* - q_0) p^* - \frac{S}{S + 1} a_s^{-\frac{1}{\gamma}} \left[ q^{\frac{S + 1}{S}} - q_0^{\frac{S + 1}{S}} \right]
\]

Substituting the values of \( q^* \) and \( p^* \) from (12) and (11) respectively, we have AE loss in exporter \( j \)

\[
= q_0 \left( (1 + t)^{\frac{\sigma \delta}{\sigma \gamma + \delta}} - 1 \right) p_s (1 + t)^{\frac{\sigma}{\sigma \gamma + \delta}} - \frac{S}{S + 1} a_s^{-\frac{1}{\gamma}} \\
\left[ q_0^{\frac{S + 1}{S}} (1 + t)^{\frac{s(1 + \delta)}{\sigma(\gamma+\delta)}} - q_0^{\frac{S + 1}{S}} \right] \\
= p_s q_0 \left[ \frac{S}{S + 1} - (1 + t)^{\frac{\sigma}{\gamma+\delta}} + \frac{1}{S + 1} (1 + t)^{\frac{\sigma(1 + \delta)}{\sigma(\gamma+\delta)}} \right] \\
\]

TOT gain in the EU/loss in exporter \( j \)

\[
= (p^* - p_s) q_0
\]

Substituting the value of \( p^* \) from (11), we get
TOT gain in the EU/loss in exporter $j$

$$= p_j q_0 \left[ (1 + t)^{\frac{\sigma_k}{\sigma_k - 1}} - 1 \right]$$  \hfill (15)

Finally we have,

Net welfare loss in EU

$$= \sum_j \sum_k q_{0jk} p_{sjk} \left[ \frac{1}{\sigma_k - 1} (1 + t_{jk})^{\frac{\sigma_k (1 + s_k)}{\sigma_k - 1}} - (1 + t_{jk})^{\frac{\sigma_k (1 + s_k)}{\sigma_k - 1}} \right]$$

AE LOSS

$$- \sum_j \sum_k q_{0jk} p_{sjk} \left[ (1 + t_{jk})^{\frac{\sigma_k}{\sigma_k - 1}} - 1 \right]$$

TOT LOSS

Net welfare loss in exporter $j$

$$= \sum_k q_{0jk} p_{sjk} \left[ \frac{S_k}{(S_k + 1)} + \frac{1}{(S_k + 1)} (1 + t_{jk})^{\frac{\sigma_k (s_k + 1)}{\sigma_k - 1}} - (1 + t_{jk})^{\frac{\sigma_k (s_k + 1)}{\sigma_k - 1}} \right]$$

AE LOSS

$$+ \sum_k q_{0jk} p_{sjk} \left[ (1 + t_{jk})^{\frac{\sigma_k}{\sigma_k - 1}} - 1 \right]$$

TOT LOSS

Then applying the available data to (16) and (17) we calculate the dollar values of the welfare loss corresponding to the three different tariff schedules $t_p$, $t_m$ and $t_c$. Using (16) and (17), we can also derive the allocative efficiency loss and terms of trade loss corresponding to the special scenarios shown in Table 3.
IV. DATA

Data on EU bilateral c.i.f.\textsuperscript{14} prices ($p_s$) and the corresponding imports ($q_0$) at the six-digit Harmonized System are obtained from the Comtrade database for the year 2004. Data on the ad valorem and specific components of EU MFN and preferential tariff rates for the year 2004 are obtained from the MAcMap-HS6v2.02 database (Boumellassa et al., 2009). We construct the ad valorem equivalents of specific tariffs by dividing the specific tariffs by the Exporter’s Reference Group Unit Values. We denote by $t_p$, the sum of the preferential ad valorem tariff and the ad valorem equivalent of the preferential specific tariff. We denote by $t_m$, the sum of the MFN ad valorem tariff and the ad valorem equivalent of the MFN specific tariff. Finally, we construct the mean ad valorem tariff equivalent $t_c$ for each importer-commodity pair as the average $t_m$ over all exporters, weighted by the product of the price elasticities of import demand and free-trade imports (Leamer, 1974) as:

$$t_{cik} = \frac{\sum_j \sigma_{ik} q_{0ijk}(1 + tm_{ijk})^{-\sigma_k} tm_{ijk}}{\sum_j \sigma_{ik} q_{0ijk}(1 + tm_{ijk})^{-\sigma_k}}$$

where $i \in \{EU\}$ is the importer index and all other notations follow the definitions in Section III. The differences in the welfare loss corresponding to $t_p$ and $t_m$ show the effect of eliminating EU preferential tariffs on SSA agricultural imports. This is Stage 1 of our experiment. The differences in the welfare loss corresponding to $t_m$ and $t_c$ show the effect of converting EU specific tariffs on SSA agricultural imports to ad valorem tariffs. This is Stage 2 of our experiment. To avoid aggregation bias, we perform all tariff changes at the individual country and tariff line level. The results are then aggregated for presentation and analysis.

Agricultural imports from SSA ($9.67$ billion) constitute less than $10\%$ of total EU imports. For agricultural exports to the EU, SSA faces a lower preferential tariff ($4.7\%$) when compared to non-SSA ($9.3\%$). This is to be expected, since the EU extends preferential market access to agricultural imports from SSA. But SSA faces a higher average ad valorem equivalent of MFN tariffs ($14.7\%$) relative to non-SSA ($11.8\%$); consistent with the hypothesis that exports from SSA have lower unit values on average when compared to exports from non-SSA. To compute the welfare loss, we also need data on the price elasticities of import demand ($\sigma$) and export supply ($S$) for the EU. We obtain the former from Kee et al. (2008), and the latter from Broda et al. (2008) which contains estimates of the commodity-specific export supply elasticities for the US. We apply these elasticities to the EU, assuming that the EU faces identical elasticities.

\textsuperscript{14} Cost, insurance and freight (the price on which import tariff is applied)
V. RESULTS

We present the welfare changes from Stages 1 and 2 in Table 4. Stage 1 generates an allocative efficiency loss in the EU and SSA equal to $578 million and $719 million respectively, and a terms of trade gain in the EU matched by an equivalent terms of trade loss in SSA of $1237 million. Non-SSA faces no tariff change and therefore no welfare change. We attribute the higher allocative efficiency loss in SSA to the observation that the EU faces a relatively steep export supply curve compared to the import demand curve. The average export supply elasticity on agricultural goods faced by the EU is 1.92 and the corresponding import demand elasticity is -3.21. These relative elasticities also explain the strong terms of trade effect relative to the allocative efficiency effect. In Stage 2, SSA gains $522 million and $729 million respectively in terms of allocative efficiency and terms of trade due to lower tariff rates. The EU faces an allocative efficiency gain of $389 million since it now levies a more uniform tariff across its exporters while maintaining the same trade-weighted average tariff rate. But the EU also faces a terms of trade loss from levying lower tariffs on SSA imports. This loss is partly compensated by the higher tariffs on non-SSA imports resulting in a net terms of trade loss of $113 million. The higher tariffs on non-SSA imports generate allocative efficiency and terms of trade losses for non-SSA equivalent to $722 million and $616 million respectively. So the uniform tariffs levied in Stage 2 essentially switch the destinies of SSA and non-SSA. The combined results from Stages 1 and 2 suggest that 64% of the welfare gains enjoyed by SSA from the preferential

<table>
<thead>
<tr>
<th>Region</th>
<th>Stage 1 AE Change</th>
<th>Stage 1 TOT Change</th>
<th>Stage 1 Welfare Change</th>
<th>Stage 2 AE Change</th>
<th>Stage 2 TOT Change</th>
<th>Stage 2 Welfare Change</th>
</tr>
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<tbody>
<tr>
<td>EU</td>
<td>-578</td>
<td>1237</td>
<td>659</td>
<td>389</td>
<td>-113</td>
<td>276</td>
</tr>
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<td>SSA</td>
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<td>-1237</td>
<td>1956</td>
<td>522</td>
<td>729</td>
<td>1251</td>
</tr>
<tr>
<td>Non-SSA</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-722</td>
<td>-616</td>
<td>-1338</td>
</tr>
</tbody>
</table>

Source: Authors’ analysis based on data sources discussed in the text.

15. This is consistent with the terms-of-trade argument (Bagwell et al., 2006) which shows that the terms of trade changes resulting from tariff cuts are significantly large and play an important role in a country’s decision to join a trade agreement. According to this argument, trade agreements are useful to governments as a means of helping them escape from a terms-of-trade-driven Prisoners’ Dilemma. Broda et al. (2008) provides an empirical support of this argument by showing that the tariff choices of non-WTO countries reflect their ability to manipulate their terms of trade.

16. For a small importer, an increase in tariff dispersion increases the trade restrictiveness and welfare loss. (Anderson et al., 2007; Feenstra, 1995; Irwin, 2010). In our large importer case, it increases the allocative efficiency loss. This explains why trade agreements seek to lower both tariff distortions and tariff peaks.
tariffs on its agricultural exports to EU are washed away by the specific tariffs levied by the EU. The welfare loss to SSA from EU specific tariffs is equivalent to 12.7% of SSA agriculture exports to the EU. This finding highlights the discriminatory nature of specific tariffs. It suggests that we can add specific tariffs to the list of factors thought to be eroding away the effectiveness of non-reciprocal/unilateral trade agreements meant to expand trade and promote development in poor countries. This widely debated list includes other ‘culprits’ like limited product coverage, proliferation of regional trade agreements, attached side conditions and Rules of Origin.17

This model does not account for substitution across imported and domestic commodities and across different imported varieties, and also ignores all inter-sectoral linkages and income effects. To capture these effects, we run the two stages of the experiment in a computable general equilibrium Global Trade Analysis Project (GTAP) model (Hertel, 1997), analyzing simultaneously the trade policy of multiple importers and exporters. The results, to be presented in a separate working paper, suggest that 72% of the preferential tariff benefits enjoyed by poor country exporters are taken away by the specific tariffs levied by the rich country importers. But the merits of the general equilibrium model come at a cost. The GTAP model assumes a Constant Elasticity of Substitution (CES) demand function into which all goods enter symmetrically. This is not compatible with our scenario of different quality goods being exported from different countries at different prices. Moreover, implementing the general equilibrium model requires aggregating countries into regions and aggregating products into commodity groups. Due to multiple tariff lines within each aggregate commodity group, such aggregation may hide compositional effects where the aggregate tariff faced by an exporter is determined by the composition of its exports.

VI. ROBUSTNESS CHECKS

We also run our experiment using an alternative benchmark tariff schedule tc’, which is the importer-commodity version of the Uniform Tariff Equivalent in

17. The GSP was designed to promote the development of poorer countries based on an infant industry argument (UNCTAD, 1964). But recent studies discussed in Lima˜o et al. (2006) show that the GSP and other unilateral preferences provided by the EU and United States often have side conditions attached that are valued by the preference-granting country and potentially costly to the recipient. A FAO Trade Policy Brief (ftp://ftp.fao.org/docrep/fao/008/j5424e/j5424e01.pdf) argues that limited product coverage and constraints on preference utilization, together with supply side problems, have prevented the full use such of trade preferences by the majority of preference-receiving countries. Also, the proliferation of bilateral trade agreements has resulted in the erosion of unilateral preference benefits. As an example, they state the relative loss of preferences by the Caribbean Basin Initiative beneficiaries when NAFTA was created. This explains the finding that although close to 80 least developed and small island developing states benefit from non-reciprocal preferences, they account collectively for less than 2 percent of world agricultural exports. Meeting rules of origin prove costly for developing countries (administrative costs, constrained supply of intermediate imports etc.) discussed in Krishna (2005), Krishna and Krueger (1995), Falvey et al. (1998, 2002).
Kee et al. (2009), which in turn is derived from the Trade Restrictiveness Index proposed by Anderson (1998). While the Uniform Tariff Equivalent is the uniform tariff across all commodities which leaves welfare for the importer unchanged, our benchmark tariff \( tc' \) is the uniform tariff across all exporters which leaves welfare for each importer-commodity pair unchanged.

Mathematically,

\[
 tc'_{ik} = \left[ \frac{\sum_j \sigma_{ik}q_{0ijk}tm_{ijk}^2}{\sum_j \sigma_{ik}q_{0ijk}} \right]^{1/2}
\]

where \( i \in \{\text{EU}\} \) is the importer index and all other notations follow the definitions in Section III. Using \( tc' \) as our benchmark tariff does not change our results qualitatively and suggests that 67% of the welfare benefits enjoyed by Sub-Saharan Africa from EU preferential tariffs are taken away by the specific tariffs levied by the EU.

We also run our experiment using an alternative measure of unit value. Our baseline results use the Exporter’s Reference Group Unit Value (ERGUV) to compute the ad valorem equivalents of specific tariffs. An alternative is the bilateral unit value constructed by dividing the c.i.f import value by the corresponding import quantity. Again, while this does not change our results qualitatively, it makes them stronger. This is because the bilateral unit value has a higher dispersion than the ERGUV by construction, which generates larger within-commodity cross-exporter dispersion and a larger distortionary effect from specific tariffs. But the cost of using bilateral unit value is that it is more prone to measurement errors (Bouët et al., 2004).

VII. CONCLUDING REMARKS

Our paper is the first at quantifying the costs from specific tariffs accruing to poor countries. The MFN specific tariffs levied by rich WTO member countries translate into higher ad valorem equivalents for the exporters of low price goods, who are primarily low-income countries. This suggests that the preferential tariff benefits enjoyed by poor countries might be offset by the losses from specific tariff. We calculate the losses from specific tariffs and compare them to the gains from preferential tariffs. We show that the specific tariffs levied by the EU on its agricultural imports wash away more than half of the welfare gains enjoyed by the Sub-Saharan African countries from EU preferential tariffs.

REFERENCES


Hertel, T.W. 1997. “Global Trade Analysis: Modeling and Applications”, *Cambridge University Press*


Hoekman, B., F. Ng, and M. Olarreaga 2002. “Eliminating Excessive Tariffs on Exports of Least Developed Countries”, *World Bank Economic Review*, 16(1), 1–21


Narayanan G., and Terrie L. Walmsley, (Ed.). 2008. “Global Trade, Assistance, and Production: The GTAP 7 Data Base”, *Center for Global Trade Analysis, Purdue University*.

