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RULES OF ORIGIN, PREFERENCES AND DIVERSIFICATION IN APPAREL: AFRICAN EXPORTS TO THE US AND TO THE EU

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ABSTRACT

Rules of Origin, Preferences and Diversification in Apparel: African Exports to the US and to the EU*

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JEL Classification: F12, F13 and F15
Keywords: agoa, eba, regional integration and rules of origin

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Rules of Origin, Preferences and Diversification in Apparel: African Exports to the US and to the EU*

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ABSTRACT

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Keywords: Rules of Origin, Regional Integration, AGOA, EBA, ACP, African Least Developed Countries.

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1. Introduction

Any preferential trading scheme falling short of a full-fledged Customs Union, such as Free-Trade-Areas (FTAs) which are reciprocal,the Generalized System of Preferences (GSP) or other non-reciprocal preferential schemes granted by industrial countries to developing countries, require Rules of Origin (RoO) to prevent trade deflection. Indeed trade deflection occurs when, for instance, foreign apparel purchased from countries non-members to the preferential agreement are re-exported to another member at a lower price while pretending it is produced in a country member. Examples of non-reciprocal preferential schemes include the African Growth Opportunity Act (AGOA) giving preferential access to the US market and the Cotonou agreement or the Everything but Arms (EBA) initiative giving market access to the EU to a group of 50 Lesser Developed Countries (LDCs). As with reciprocal preferential schemes, preferential access is conditional on meeting originating status requirements for goods that are embodied in system-wide RoO and, especially, in product-specific rules of origin (PSRO) for sectors in which a fair degree of processing takes place. These PSRO are multiple and particularly complex for Textiles & Apparel (T&A), a key sector for developing countries where low labor costs give them a comparative advantage.

A growing empirical literature concludes that the requirements serve as protectionist devices that end up impeding market access for the intended beneficiaries. The evidence is based on two key ingredients: utilization rates of preferences becoming available at the HS-6 level (PSRO are usually defined at the HS-6 level) and synthetic ordinal indexes, based on simple observation rules intended to capture in a single index the complexity of multiple PSRO at the tariff-line level. Repeated inspection of disaggregated data indicates a positive correlation between the extent of preferences and the value of the constructed restrictiveness indexes (a higher value of the index indicating a more restrictive PSRO) and also a tapering off or even decline in utilization rates as preferential margins increase. These correlations have lead researchers to conclude that PSRO are “made-to-measure” protectionist devices.[1]

The presumption in this literature is that variation in utilization rates is a plausible indicator of the restrictiveness of a RoO regime. Yet, while the theoretical literature distinguishes between fixed administrative costs (often estimated at around 2-3% of the product price—see e.g. Manchin (2006)), the data also often shows high utilization of preferences for tariff lines with zero MFN tariffs, casting doubt on the validity of utilization rates as a proxy indicator of the costs associated with meeting RoO requirements since, if meeting requirements is costly, exporters should not file for preferential status when the tariff is zero. Likewise, high utilization rates of preferences should suggest low costs. Indeed, to give an example using data from this study, between 90% and 97% of qualifying African exports of apparel to the US and EU enter under their respective preferential regimes, AGOA for the US and EBA or Cotonou preferences

[1] Krueger (1999) is the seminal paper in the literature and Estevadeordal’s (2000) study on Mexican exports under NAFTA is the first empirical paper to introduce a synthetic ordinal index of restrictiveness for PSRO (the EU has over 500 different PSRO). In constructing the synthetic index, special transformation requirements, a higher originating value content requirement or a change of tariff classification at the section rather than subsection level are all taken as indicators of a more restrictive PSRO in the observation rule. Cadot et al. (2005) and Carrère and de Melo (2006) use this index in their evaluation of PSRO for Mexican exports under NAFTA, and Portugal-Perez (2008) use it to quantify the impact of political economy” determinants and of those considered as “justifiable” on the ground of preventing trade on the restrictiveness of RoO under NAFTA,

for the EU, yet export growth of T&A to the two destinations has been drastically different in recent years in spite of remarkably similar average preferential margins (US MFN tariff of 11.5% in 2004 and EU preferential margin of 11.%). Thus assessing the restrictiveness of RoO based on an inspection of utilization rates would suggest low costs, yet export growth has been different across these two destinations.

This paper exploits a quasi-experimental situation where a change in the PSRO under AGOA relative to the no-change environment under EBA (or Cotonou) to provide alternative (to utilization-rate-based) estimates of the costs of RoO for a group of African countries. Insofar as the World Trading System aims to provide preferential access to the lesser developed countries (LDCs), assessing the effects of current RoO applied by industrial countries is useful. Such estimates are also useful in view of the growing number of Free Trade Agreeements around the world, many of which involve developing countries who are likely to adopt PSRO resembling those already adopted by the EU and the US.

The analysis is based on product-level exports at the HS-6 level for sectors HS 61 (knitted apparel) and HS-62 (non-knitted apparel) over the period 1999-2004 which spans the period when the US changed its PSRO to the "Special Regime" (SR) for selected African exporters. We estimate that, after controlling for other factors, relaxing RoO by allowing the use of fabric from any origin under the SR increased significantly apparel exports to the US by about 300% for the top seven African exporters in the group. In addition to this increase in exports at the extensive margin, we also observe a higher rate of increase of new products exported to the US than to the EU during the period.

The rest of the paper is organized as follows. Section 2 describes briefly the conditions for preferential access to the US and EU markets and aggregate exports to each market. Section 3 sketches a price-taking firm producing apparel for export sale from textiles originating in qualifying and in non-qualifying third countries. Section 4 describes the results and section 5 concludes.

2. Qualifying for Preferential Market Access Under EU and US Preferences in Textiles and Apparel [2]

Apparel under GSP and EBA. Since 1971, the Generalized System of Preferences (GSP) provides non-reciprocal preferential access to the EU market. For T&A, PSRO required that apparel should be manufactured from qualifying yarn and sometimes wholly produced. Production from yarn entails that a <u>double transformation process</u> must take place in the beneficiary country with the yarn being woven into fabric and then the fabric cut and made-up into clothing.[3] Under the "Single List" in operation since 2000, the EU GSP system also

[2] See figure A1 in appendix A and appendix C for a detailed description of these requirements.
[3] In 1999, EU efforts to harmonize the RoO across its different PTAs were translated into a so-called "single list" (SL) of product-specific rules of origin (PSRO) that was implemented in its GSP scheme in July 2000. The SL provisions generalized the "double transformation process" to all apparel lines grouped under chapter 61 and 62 of the HS classification.

accepted bilateral cumulation[4] between the EU and a beneficiary country. Regional cumulation could also take place but only within three regional groupings: ASEAN, CACM, and the Andean Community, but not amongst African countries.[5]

Under the Cotonou agreement which is an alternative preferential scheme available for African exporters in this study, the provisions for PSRO for T&A were also drawn from the EU “single list”. However, while EBA, or GSP, limits cumulation to a bilateral basis between a beneficiary country and the EU, the Cotonou agreement authorizes full cumulation among African countries, so that regional fabrics can be used in the making of apparel without losing originating status. Therefore, countries eligible to ACP preferences that are also eligible to EBA, may, and indeed often do, prefer to continue exporting under the ACP regime since both schemes give duty-free access while the Cotonou regime (which has also been in place for longer than EBA preferences) provides for a more liberal cumulation scheme. Hence utilization rates in table 1 refer to the combined preference uptake under the EBA and Cotonou schemes.

Apparel under AGOA. Operational since the second semester of 2000, AGOA provides tariff-free access for many goods, such as watches, footwear, handbags, luggage, work gloves, and apparel, that were excluded under the standard US GSP programme [6]. PSRO for apparel under AGOA were designed in the spirit of the triple transformation process for apparel prevalent under other US preferential trade agreements such as NAFTA or the Caribbean Basin Initiative (CBI). RoO require that all the intermediate stages take place either in a beneficiary country or in the US. More precisely, AGOA provides quota-free and duty-free treatment to apparel assembled in one or more AGOA eligible country from US fabrics (or a African-country fabrics up to a specified percentage), which in turn are made from US yarn. However, the “Special Rule” (henceforth referred to as the ‘SR’) for Lesser Developed Countries” established since 2001 (see table 1 for the date of entry into force) relaxed the triple transformation rule by conferring duty-free access to apparel regardless of the origin of fabric used to produce it, thus applying a <u>single-transformation</u> requirement (fabric →apparel).

By the end of 2004, 22 countries benefited from the SR under AGOA. Figure 1 shows the evolution of export volumes (1a) and preference margins (1b) to the US and to the EU from the 22 countries benefiting from simple transformation rule under the AGOA-SR. The data are aggregated over a potential of 111—knitted (HS-61) and 118 non-knitted (HS-62)apparel

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[4] Cumulation allows producers from a PTA to import non-originating materials from other member countries without affecting the final product’s originating status. Bilateral cumulation applies to trade between two partners stipulating that producers in country A can use inputs from country B without affecting the final good’s originating status provided that the inputs are themselves originating in B (i.e. satisfying the area’s RoOs).

[5] As an extension of the EU GSP scheme, the EBA initiative provided duty-free access from March 2001 to a group of 50 GSP-eligible countries which did not amount to any additional market access for ACP countries who already had virtually duty-free access under Cotonou preferences. Importantly, duty-free access for apparel to the EU market rests on the SL criteria described above for the previous GSP system.

[6] The US allowed GSP treatment to some categories of handicraft textiles under signature of an agreement to guarantee certification that the items are handmade products of the exporting beneficiary. Nevertheless, none of the textiles eligible to this “handicraft textiles arrangement” were classified into CH-61 or CH-62, which are the apparel articles examined in this paper.

products defined at the HS-6 digit level.[7] Note from figure 1(b) that the MFN tariffs are very similar for both countries throughout the period, and so are the preferential margins once AGOA is operative.

Two trends are apparent. First, prior to 2000, the paths of African apparel exports to the US and to the EU are alike. Then, apparel exports to the US increased substantially, with the timing of the change in the growth path coinciding with the entry into force of AGOA in 2000. By contrast, the value of exports to the EU for this same group of countries remained relatively flat from 1996 until 2000 and then declined mainly because of the political crisis that hit Madagascar, the largest exporter to the EU (see table 1), at the end of 2001. [8]. Second exports to both markets are dominated throughout by 7 large exporters who follow quite similar trends in both markets (see figure A3 in appendix A) indicating that not all countries benefited equally from the SR.

Figure 1 (a) Apparel exports of 22 countries benefiting from AGOA-SR by 2004
Figure 1(b) Preferential margins to the US and EU markets.

Among countries qualifying for the AGOA SR, 7 countries accounted for the overwhelming majority of exports during the period. These are listed in table 1 and include Botswana, Kenya, Lesotho, Madagascar, Malawi, Namibia and Swaziland. Each exported apparel to the US for at least 10 million USD in 2004 and their exports accounted for 97.7% of apparel exports to the US and EU from the 22 countries benefiting from the SR in 2004. The last column of table 1 gives the year when the SR came into effect for each country. Note that the 7 major exporters are among the early recipients of the SR, but that three others that did not take off (Ethiopia, Uganda and Zambia) were also among the early recipients.

Table 1 here: Countries Benefiting from AGOA SR in 2004

Table 1 also reports two columns with the utilization rate of preferences across product for each of these 22 countries when exporting to the EU under EBA or Cotonou, and when exporting to the US under AGOA. Countries with an important volume of exports to either destination have a high rate of utilization of preferences so that taking the 22 countries as a group, the utilization of preferences was 97.6 % for AGOA and 91.2% for EBA or Cotonou. Yet, in spite of these high utilization rates under both schemes, export volumes evolved quite differently.

As a first step, we carry out an « event-analysis» to control for the fact that the SR was not granted to all beneficiaries on the same year. We reorganize the data by converting calendar-years into event-years and carry out two sets of estimates. Using the aggregate volume of

[7] To save space, we do not report separate trends for knitted and non-knitted apparel since the two are very close for both countries. As expected, the EU imports more knitted than non-knitted apparel (see figure A2 in appendix A). This pattern is consistent with the observation that PSRO such as the double transformation rule will be more costly for non-knitted than for knitted apparel since no fabrics is involved for knitted apparel. As to the US, knitted and non-knitted exports were similar in 2000, but knitted exports grew faster thereafter.

[8] Following a contested presidential election in late 2001, a political deadlock that lasted over 6 months paralyzed the country with a collapse of the fast-growing textile industry resulting in an estimated loss of about 150,000 jobs in 2002..

apparel exports to the US for each one of the 22 countries eligible for AGOA over the 1996-2004 sample period used later on, we check for changes around the time when the SR was introduced by estimating:

$$\ln\left(Y_{jt}\right) = \beta_0 + \beta_1 \times SR_{jt} + \beta_2 \mu_j + \varepsilon_{jt}$$
$$\ln\left(Y_{jt}\right) = \alpha_0 + \alpha_1 \times Year_{jt} + \alpha_2 \mu_j + \varepsilon_{jt}$$
$$\Delta \ln(Y_{jt}) = \gamma_0 + \gamma_1 SR_{jt} + \gamma_2 \mu_j + \varepsilon_{jt}$$

where Y_{jt} are country j's exports to the US in year t; SR_{jt} is a dummy variable denoting if the SR regime is active; μ_j is a vector containing exporter-specific dummies; $Year_{jt}$ denotes the event-year in which a country benefits from the SR Results are reported in table 2.

Table 2 here: Event-analysis based aggregate growth of apparel to the US market

The coefficients detecting changes in export growth after the introduction of the SR reported in columns 1 and 2 are highly significant suggesting that something happened to aggregate apparel exports to the US around the time when the SR was adopted. The estimates indicate that the SR is associated with an average increase of about 305% (=exp(1.4) -1) in apparel exports for the bloc of 22 countries (col. 1) and growth of apparel exports of nearly 24% (=exp(0.22)-1) (col.2). Results are robust to the exclusion of the exporter-specific dummies (cols 3 and 4). Though estimated less precisely, the estimates in column 5 suggest that the SR increases apparel exports from the bloc of African countries by about 64% per year, an estimate that holds up to the removal of the exporter dummies (column 6).[9]

3. Modelling Exports under Binding ROO

Consider the following simple model of the apparel market under a PSRO. Competitive African firms produce a differentiated product under CRTS according to a technology to be described shortly and face a downward sloping for the differentiated product they sell in the US and EU markets where they compete with exports from other developing countries who sell at MFN-tariff-inclusive unit price p_w^k (see below) in country k, $k \in K = \{EU, US\}$. Then, under the assumption that the tariff-induced rents accrue to exporters, the internal price of African apparel in country k is $p^k = \left(1 + t^{k,pref}\right) q^k$, where $t^{k,pref}$ is the tariff applied to African apparel by country k, and q^k is the border price. The demand function for African apparel in country k, X_D^k, can be written as:

$$X_D^k\left(p^k, Y^k, PS_w^k\right), \text{ with } \partial X_D^k / \partial p^k < 0,\ \partial X_D^k / \partial Y^k > 0, \text{ and } \partial X_D^k / \partial PS_w^k > 0 \qquad (1.1)$$

where Y^k is the income of country k; PS_w^k is a market price index of apparel substitutes to African apparel that is imported under the MFN regime from other countries, such as Asian

[9] Because of the large number of zeroes when at the product line (between 70% and over 90% of the 229 export lines have zeroes in most if not all years), and the fact that some countries had zero aggregate exports of apparel in some years, table A1 in Appendix A reports estimates with a smaller sample of 16 countries with no holes in aggregate exports at some point in the sample period. The results are very close to those reported in table 2.

imports that were also subject to quotas. Then, $PS_w^k = \overline{PS}^* \left(1 + t^{k,MFN}\right)$ with $\overline{PS}^*$ indicating the (exogenously given) border price of apparel imported on a non-preferential basis and subject to an MFN tariff $\left(t^{k,MFN}\right)$.

Profit- maximizing, price-taking, African apparel producers equate marginal revenue and marginal cost:

$$p^k(\ ) + \frac{\partial p^k(\ )}{\partial X^k} \ X^k = \left(1 + t^{k,pref}\right) \ \left(MC_X^k\right). \tag{1.2}$$

where $p^k(\ )$ is the inverse demand function of apparel from country k.

The model is completed by describing how RoO affect firms' marginal costs. For simplicity, but without loss of generality, let apparel be assembled by combining value added with an intermediate good (fabric or textiles) under a Leontief technology with an input-output coefficient, a_V: $X = \min\left\{ f(K,L);\ V/a_V \right\}$. Fabric (textiles) from different sources are perfect substitutes with V^{EU} representing fabric produced either domestically or imported from countries qualifying for cumulation under EU schemes at price p_V^{EU}. Third-country (say Asian-source) fabric, V^*, is imported from the rest of the world at price p_V^*. Then $V = V^{EU} + V^*$ is the total quantity of fabric used. African producers are assumed to be price-takers in the market for textiles so $\left(p_V^{EU}, p_V^*\right)$ is fixed.

Let $\varphi(X)$ be the value added cost function dual to the value added production function, $f(\ )$, and $\varphi'(X) \equiv d\varphi(X)/dX$ the corresponding marginal cost function assumed to be constant (African producers hire domestic factors at constant prices) . With perfect substitutability across intermediates, in the absence of a ROO requirement, African producers will choose the cheapest source, as they do under the SR. Then the marginal cost of apparel exported to the US is constant and given by:

$$MC_X^{US}(\ ) = \varphi'(X) + a_V \min\left\{ p_V^{EU}, p_V^* \right\} \tag{1.3}$$

By contrast, to qualify for EU preferences under EBA or ACP, African exporters have to use fabric qualifying for cumulation with a binding RoO specifying a minimum value content r expressed here as a proportion of total intermediate use (as shown in Appendix C, to qualify for preferential access in the EU market, on average, producers had to have 7% of originating inputs from qualifying countries). In the unlikely case where EU fabric is the cheapest ($p_V^* > p_V^{EU}$), then $V = V^{EU}$ and expression (1.3) also describes the marginal cost of apparel exported to the EU. But, when $p_V^{EU} > p_V^*$, the RoO becomes binding and the marginal cost of apparel qualifying for preferences under EBA or ACP is expressed by:

$$MC_X^{EU}(\ ) = \varphi'(X) + a_V \left[r p_V^{EU} + (1-r)\, p_V^* \right] \tag{1.4}$$

With a value-content restriction (or equivalently a double transformation rule) marginal cost for sales to the EU will be an increasing function of the restrictiveness of the ROO, i.e.

($dMC_X^{EU}\left(r\right)/dr > 0$).

Letting X^k denote equilibrium sales in market k, under fairly general conditions describing the demand curve (see Appendix 1) that are satisfied by a linear demand curve, total differentiation of (1.2) leads to:

$$\frac{dX^{EU}}{dr} < 0 \text{ and } \frac{dX^k}{dY^k} > 0, \frac{dX^k}{dt^{k,pref}} < 0, \frac{dX^k}{dt^{k,MFN}} > 0 \text{, for } k \in K = \left\{EU, US\right\}, \qquad (1.5)$$

These comparative static results guide the empirical analysis that follows (see Portugal-Perez (2008) for a graphical analysis). First, other things equal, binding RoO reduce equilibrium export sales of EBA/ACP beneficiaries to the EU. If the production decision and the allocation decisions across markets are separable, then the introduction of the SR--which is equivalent to a relaxation of the binding ROO to the US market-- will lead African firms to redirect sales to the US market.[10] Second, an increase in income in the EU or US leads to an increase in sales (if apparel is a normal good). Third, an increase in preferences (i.e. a lower value of $t^{k,\,pref}$ as under AGOA when previously excluded apparel now qualified for preferential access also leads to an increase in sales. Fourth, preference erosion via a decrease in MFN tariffs leads to a reduction in sales as substitutes from third-countries replace African apparel export sales. As will be shown below, all four comparative statics predictions are confirmed in the data.

4. Evidence

We now take the model's prediction to the data discussing first the specification of the model and the data, then how we selected the sample in view of the large number of zero trade flows in the data. Ideally, the model would require data on costs at the product level to measure how restrictive the double transformation rule actually is. Unfortunately no such data are available at the sector level, let alone at the product level, and we are forced to resort to dummy variables to capture the effects of the double transformation rule.

4.1. Model Specification and data.

Model Specification. The model above suggests that, after controlling for idiosyncratic factors in each market, export sales of individual textile products towards the EU and US destinations should depend on changes in preferential access, changes in income per capita capturing demand shifters in the EU and the US and on changes in PRSO. Assuming, a log linear relationship, we estimate:

$$\begin{aligned} \ln\left(a_V + X_{i,t}^{j,k}\right) &= \beta_0 + \beta_1\left(R_{i,t}^{j,k}\right) + \beta_2\left(VC_{i,t}^{j,k}\right) + \beta_3\left(t_{i,t}^{k,mfn}\right) + \beta_4\left(t_{i,t}^{j,k,pref}\right) \\ &+ \beta_5 \ln\left(Y_t^k\right) + \beta_6 D_i^{Madag-02} + \sum_{j\in J}\sum_{k\in K}\delta_{j,k}\left(D_i^j \times D_i^k\right) + \varepsilon_{i,t}^{j,k} \end{aligned} \qquad (1.6)$$

$$j \in J = \left\{7\text{(or 22) African exporters}\right\}$$
$$k \in K = \left\{\text{EU,US}\right\} \quad \text{t = 1996,...,2004}$$

[10] De Melo and Winters (1991) analyze a similar situation for the allocation of VER-restricted exports of footwear to restricted and unrestricted markets under separable and non-separable production and allocation decisions.

$$i = 1,\dots,229 \in \text{(CH61-CH62)}$$

where :

- $X_{i,t}^{j,k}$ are exports of apparel variety i from African country j to country k (EU or US) in year t.
- a_V is a parameter to be determined (see below)
- $R_{i,t}^{j,k}$ is a dummy variable that captures the SR. It is set equal to one if country j benefits from the AGOA-SR allowing the use of textiles from any source and still qualifying for preferences $\left(k = US\right)$ in year $t(\geq 2000)$, and zero otherwise. $R_{i,t}^{j,k}$ is set equal to one for the first year and the consecutive ones, if country j has benefited from eligibility to benefits of the apparel provision for more than four months during the year. For example, Botswana and Malawi were entitled the special regime from August 2001, then the dummy is set equal to one for t = 2001 and for successive years ($t \geq 2002$).
- $VC_{i,t}^{j,k}$ is a dummy variable taking the value one if non-knitted apparel (CH-62) of variety i is subject to an alternative (or optional) less restrictive regional VC rule allowing apparel non-qualifying for cumulation provided that its value does not exceed 40% (or in some cases 47.5%) of the product price in year $t(\geq 2000)$ when exporting on a preferential basis to the EU$\left(k = EU\right)$, and zero otherwise.
- $t_{i,t}^{k,mfn}$ is the MFN tariff applied on apparel product i by importer k in year t.
- $t_{i,t}^{j,k,pref}$ is the preferential tariff applied on apparel product i imported from j that benefits from country k's preferential regime when complying with RoO. Preferential tariffs are set equal to the MFN tariff prior to the implementation of a preferential agreement and set equal to zero once a preferential regime is implemented (set equal to zero throughout the period for the EU and starting in 200o for the US).
- Y_t^k is GDP of country k in year t.
- $D_i^j \left[D_i^k\right]$ is a dummy variable controlling for unobserved time-invariant fixed effects by exporter j [importer k] such as distance or a common language (due to multi-collinearity, export or import-specific dummies cannot be included in the model)
- $D_i^{Madag-02}$ is a dummy taking the value of 1 for Madagascar's export loss in 2002 provoked by its political crisis.
- $\varepsilon_{i,t}^{j,k}$ is the error term.

According to (1.5), expected coefficient signs are: $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 < 0$ and $\beta_5 > 0$. For the dummy controlling Madagascar's export loss, we expect: $\beta_6 < 0$

The coefficient of the VC dummy is expected to be positive but smaller than the SR-dummy.

Data. The panel covers the period 1996-2004 which coincides with the removal of quotas set out at the end of the Agreement on Textiles and Clothing (ATC) in January the 1st, 2005. Although the choice of the period was constrained by data availability, the episode is a convenient one since there is no need to control for the removal of quotas at the end of the ATC. In a post-quota world, US and EU markets are expected to be flooded by apparel from larger exporters, such as China and India, that were previously bounded by quotas. Export data and tariff data were compiled from IDB-WTO and TRAINS/WITS at the HS-6 digit level of aggregation, the most disaggregated level for international comparison purposes. GDP is expressed in constant 2000 US dollars and was compiled from the World Development Indicators.

The complete panel includes the 22 countries benefiting of the AGOA-SR and covers 229 varieties (of which 150 lines had a positive entry for at least one country-year observation) of apparel at the HS-6 level of aggregation exported to the two destinations. The sample and descriptive statistics are described in table A2 in appendix A. Because 95% of the volume apparel exports of the block are accounted for by the 7 major exporters, we restrict ourselves to commenting results of estimates on this reduced sample where data quality is arguably superior not only because there are aggregate exports every year, but also because they export a larger number of products. Estimates based on the complete sample are left as a robustness check.

4.2. Econometric strategy

The econometric strategy was guided by the trade-offs resulting from the presence of the large number of zeroes in the data Ideally, one would want to implement a two-stage procedure in which a decision to export a specific apparel product is taken in a first step, then in a second step a decision is taken on volume and destination. In order to satisfy the exclusion restriction typical in such a 2-stage Heckman estimation method, such an approach would require an appropriate exogenous instrument that would influence only the decision to export in the first-stage and not the volume of exports in the second stage. At this high level of disaggregation, the only potential instrument in this data set would be the lagged decision to export (represented by a dummy that is equal to one if the product was exported from country i to country j in the preceding period). If there were variation in this indicator, it might qualify as an instrument as, arguably, it might only influence the decision to export and not the volume. Unfortunately (see below the count estimates in section 6), in this data set, when a country decides to export a specific apparel product, it usually does so for most years, so there is little variation in this candidate instrument. Furthermore, the pattern of holes in the data (zero aggregate exports in one year, as reported by the EU or US) is difficult to decipher, suggesting that the data is often of poor quality (see table A2 in appendix A).

To deal with zero values at the product line, estimations were carried out with several estimators, in each case using a logarithmic transformation in the dependent variable equation (1.6) to avoid giving too much weight to apparel lines with a high-volume of exports. However, the use of logarithms brings in a truncation problem for observations with zero-exports. These represent around 92% of observations for the whole sample of 22 exporters, and about 70% for the reduced sample of the top-7 exporters. The standard solution in the literature (see for instance Frankel et al. (1997)) consisted of shifting all export values by one dollar (i.e. fixing a_v =1 in (1.6)) before applying the logarithmic transformation. This increases the mean of exports by one unit without affecting its variance. In addition, with this correction, tariff lines with zero exports are linked to zero values of the dependent variable ($\ln\left(1+X_{i,t}^{j,k}\right)$). Then, Tobit estimation may appropriately account for the censorship of the dependent variable. However, since the estimates of the dummy coefficient capturing the elasticity of exports to changes in the corresponding PSRO are very sensitive to this (arbitrary) choice of transformation – as shown below–, it is prudent to explore alternatives.

Eaton and Tamura (ET 1995) proposed to estimate a variation of the Tobit model in which the maximum likelihood (ML) function is modified to endogenize the choice of the a_v parameter. Then the ML estimator includes an estimate of the value of a_v among the set of estimates which means that the dependent variable will be censored at the value $\ln(a_V)$ (see Appendix D for details on the Eaton Tamura (ET) tobit Model) .

Along the same lines, Santos Silva and Tenreyro (SS-T) (2006) propose a Poisson Pseudo Maximum Likelihood (PPML) model to deal with heteroskedasticity in constant-elasticity models, such as log-linear gravity models. Using Monte-Carlo simulations, they show that that the PPML produce estimates with the lowest bias for different patterns of heteroskedasticity. However, Martin and Pham (2008) pointed out that the data-generating process used by SS-T did not produce zero-values properly. When correcting the data-generating process to obtain a sample with an important number of zero-value observations –a situation closer to ours - Martin and Pham find that the ET-Tobit estimates have a lower bias than those obtained with the PPML estimator.

5. Results

We first report the main results for the sample of 7 countries with the alternative estimators, then carry out robustness checks on sample size and unobserved year-specific effects.

5.1. Main Results.

Table 3 presents the results from estimating (1.6) with the last row reporting the estimated elasticity of exports to the introduction of the SR (as captured by the $R_{i,t}^{j,k}$ dummy) for the corresponding estimator. In the Tobit models, this is measured by the effect of a one unit change in the dummy variable on lines with positive exports (see appendix D for a discussion of the ET Tobit and the computation of marginal effects). Column 1 reports the truncated OLS method with the logarithm of exports, ln(X), as the dependent variable which was until recently the standard way for handling the many zeroes in estimates of the gravity and many other models (very similar estimates not reported were obtained when adding one dollar to the value of the dependent variable). The estimate of β_1 suggests that the effect of switching from the double to the simple transformation rule will boost apparel exports by about 186 per cent. Note that not all coefficients have the expected sign: the coefficient of ln(GDP) is negative and the coefficient of VC is negative but both are non significant. In addition, this regression leaves out observations with zero-exports, which constitute the overwhelming majority of the sample (only 3896 observations exhibit positive exports).

Table 3 here: Elasticity of Exports to Changes in RoO

Column 2 reports OLS estimates where ln(1+X) is set as the dependent variable. As mentioned before, this transformation has the advantage of incorporating censored observations, i.e. zero-export tariff lines. The estimated β_1 is slightly reduced but still positive and significant. Although the sign of ln(GDP) and VC coefficients switch to their expected signs, including censored observations in an OLS model leads to biased estimates.

Columns 3 to 4 report Tobit-type estimates for (1.6). [11]The overall fit for the models summarized in the likelihood-ratio values and the McKelvey and Zavoina pseudo-R^2 values (at the bottom of the table) are reasonably good. The "standard" Tobit estimates in column 3 account more appropriately for the censorship of the dependent variable. Now the dependent variable is the log of imports plus one dollar, implying that a_v=1. All coefficients now have the expected sign and are significant. Notably, the estimated coefficient of the dummy capturing the presence of the SR increases dramatically. However, all coefficient values, and in particular β_1, are very sensitive to the choice of a_v used to avoid truncation.[12] Indeed, the differences between observations of the dependent variables: $\ln\left(a_V + X_{i,t}^{j,k}\right)$ becomes smaller as a_v increases.

Column 4 goes one step further and reports the ET-Tobit estimates that also estimates the value of a_v that fits best the data. These are our preferred estimates as all coefficient signs are as expected and the values are plausible even if the income elasticity estimate is high (3.4). The elimination of the restriction on the origin of fabric granted by the SR is associated with an increase of exports by a factor of 390 percent for this sample (with the full sample of 22 exporters the estimate is 278 percent[13] reflecting the inclusion of countries less effective at taking advantage of the SR, see robustness checks below).

Other estimates of the stringency of RoO are also noteworthy. According to column 4a, the presence of an alternative VC requirement for some non-knitted apparel (CH62) is associated with an increase of more than 125% (=exp(0.81)-1) in expected positive exports for these lines. Not surprisingly, easing-up the EU double transformation rule by allowing just a percentage of non-qualifying fabric is associated with an increase in exports smaller than simply removing restrictions on the origin of the fabric, as under the AGOA SR.

As to the coefficients on tariffs, a one percent increase in the MFN tariff, $t_{i,t}^{k,mfn}$, is associated with an increase in African apparel exports of about 11 percent, *ceteris paribus*, reflecting the substitution towards African apparel as apparel imported from other countries on an MFN basis become more expensive. Symmetrically, a percentage point increase in preferential

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[11] We estimate pooled Tobit models. Their underlying assumption considers the structure of the error-term uniform across exporters and years. This assumption is reasonable as African exporters in our sample have a similar structure. Moreover, as discussed by Woodridge (2002), the pooled Tobit model has several notable features. For instance, it can contain any dependent variables, such as time dummies, interactions of time dummies with time-constant or time-varying variables, or lagged dependent variables.

[12] Coefficient estimates for β_1 next to corresponding values of a_v are: (a_v =1, β_1=4.51); (a_v =0.1, , β_1=5.34); (a_v =0.01, 6.18) ;(a_v =10, β_1=3.68) confirming that the extent of bias induced by this approach depends on the relation of a_v to the sample mean.

[13] Appendix D indicates how marginal effects are evaluated in the ET Tobit model.

tariffs $t_{i,t}^{k,pref}$ produces an 8 percent reduction in exports. Therefore, the 12 percentage point reduction in tariffs applied to African imports following the implementation of AGOA in 200o shown in figure 1b is estimated to have increased African exports by about 96 percent.

The marginal effect of ln(Y) approximates an income elasticity of the demand for African apparel imports. In column 4a, the estimate of this elasticity is also high, equal to 3.7. Madagascar's export loss in 2002 attributed to its political crises (see figure A3 in appendix A) is about 55 % as captured by the marginal effect of $D_i^{Madag-02}$ at the bottom of column 4 in table 3 (dummies controlling for additional Madagascar export loss in successive years are excluded, since their coefficients are not significant reflecting the fact that exports picked up after the turmoil).

Taken together, the Tobit estimates (including the preferred ET Tobit estimates) are promising as coefficient values have the right signs and are significant. At the same time, the high values of the coefficient estimates for the VC dummy, but also for the tariff and income variables suggest the combination of omitted variable bias and measurement error, both of which produce an upward-bias in the estimates. We return to this issue in section 5.2.

Even though the model in section 4 concentrates only on the volume of exports and not on the range, the change in the probability of having the dependent variable uncensored, that is of having positive rather than zero exports, induced by a marginal change in a regressor can be computed at the tariff line with the Tobit-type models without additional data. Results for the ET-Tobit are reported in column 4b (labelled *Prob Uncens.*).[14] The estimates indicate a 5.9% higher probability of having positive exports on tariff lines benefiting from the introduction of the SR under AGOA[15]. This can be interpreted as evidence of the role of the SR on export growth at the extensive margin as easing-up RoO cuts down the costs of exporting, in turn creating an incentive to diversify exports.

These results are confirmed in figure 2 showing the evolution of the number of tariff lines with positive exports from the seven major exporters in the bloc. With the exception of Madagascar, all countries export more varieties of apparel to the US than to the EU at the end of the period and the range of apparel exported to the US increased faster than the range exported to the EU after 2000, the year AGOA was implemented, even for Madagascar.[16]

Figure 2 here: Variety of apparel exported by the 6 largest exporters to the US.

[14] The marginal effect on the "probability of uncensored variable" indicates how the probability of observing an uncensored dependent variable or –equivalent in this context- observing strictly positive exports is modified following a marginal change in an independent variable. These marginal effects are roughly equal to the estimated coefficients of the model times a positive correction term that is less than one. Hence, we report only one column of estimates.

[15] This column is estimated with the function dtobit and tobit in Stata 9, where the dependent variable ln(x+av) was computed using the ET-tobit estimate of a_v.

[16] Since data is used at the HS-6 level of aggregation, the most disaggregated level for the purpose of international comparison, new varieties exported are not detected at more disaggregated levels, say at the HS-8, when at least one variety from the same HS-6 category was already exported.

Finally, column 5 reports estimates when applying the Poisson Pseudo Maximum Likelihood (PPML) model recommended by Santos Silva and Tenreyro (SS-T) (2006) to deal with heteroskedastic errors in log-linear gravity models. Now the dependent variable is in level rather than logarithmic form, giving more weight to extreme observations and only the RoO dummy and income coefficients are significant, the loss in precision being attributable to giving probably too much weight in very noisy data at the HS-6 level. The effect of the RoO dummy now goes down to 0.85 and can be inferred directly from the SR coefficient, it still remains significant There is also a sign reversal for the VC, $t_{i,t}^{j,k,pref}$, and $t_{i,t}^{j,k,MFN}$ coefficients, the latter being no longer statistically significant.

Table 4 turns to estimates of the cumulative effects of the AGOA-SR on exports by including three additional dummy variables ($R2_{i,t}^{j,k}$, $R3_{i,t}^{j,k}$, and $R4_{i,t}^{j,k}$) to (1.6). These dummy variables-- defined in the same way as those in (1.6) to take into account that the SR provision does not kick in at the beginning of the year-- capture the supplementary or cumulative effects on exports of an additional year under the SR program so $R2_{i,t}^{j,k}$ is equal to one if country j is <u>at least</u> in the <u>second year</u> after being entitled to the SR program (which includes the third and the fourth year), and zero if not. The same applies for $R3_{i,t}^{j,k}$ and $R4_{i,t}^{j,k}$. Then, the coefficient of $R_{i,t}^{j,k}$ no longer captures the average effect on exports of benefiting from the SR, but only the cumulative effect of being at the first year under the SR program.

Table 4 here: Temporal and country-specific effects of the SR

Column 1b reports the approximate growth rates of exports computed from estimates of the dummy-coefficients in column 1a. The biggest change in exports growth is registered during the first year suggesting that preferential exports increased immediately after the implementation of the SR which is what one would expect in clothing where fashion changes rapidly from season to season and hence input requirements change constantly, so relaxing input requirements have an immediate effect on exporters. Of the average cumulated increase of 324% in the three year period, close to 60% occurred in the first year.

Columns 2a and 2b show the differential cumulative effect of the SR across the 7 exporters. The effect for all countries is positive, although the two smallest coefficients, for Botswana and Lesotho are not significant. The effect of the SR on exports from Namibia and Malawi are found to be the largest, probably reflecting the low export volume for these countries in 2000.(see figure A3 in appendix A)

The differential performance among receivers of the SR begs the question why some African countries were so much more successful at taking up preferences and at experiencing higher export growth in apparel? Among others, a possible explanation lies in the business environment of a country that may be more conducive to attract foreign investment on apparel plants and diminish trading costs which can be proxied by a country's rank in the World Bank "Doing Business" indicator.[17]

Figure 3 here: Export Growth and Ease of Doing Business Indicator

Figure 3 confronts the Ease of Doing Business (DB) 2008 ranking of African countries benefiting from the SR against their apparel export growth during AGOA (measured by the difference of exports (in logs) at 2004 and at the beginning of AGOA). Indeed, on average countries best ranked along the DB indicator experienced higher growth in apparel exports during AGOA, and the correlation coefficient, ρ=-0.55 is highly significant[18].

5.2 Robustness Checks and Extensions

We report the results from several robustness checks. First, we replicated the estimations reported in table 3 for two samples: the full sample of 22 countries (table A3 in appendix A) and a sample of the top 6 exporters that excludes Madagascar. (table A4 in appendix A). Table 5 reports the results for our preferred ET-Tobit specification. With a few exceptions, they are globally similar to those in table 3. As expected, the dummy for turmoil in Madagascar in 2002 loses significance when all 22 countries are included in the sample. However, more surprisingly, the coefficient value of the VC dummy is now larger than the one for the SR which might reflect the inclusion of a large number of small countries that were not successful at taking up preferential market access under the SR context.

Column 4 reports the results of another exercise that controls for unobserved year-specific effects by adding time dummies to the model. None of their coefficients were significant as if no unobserved effect specific to a single year was left unexplained by all other dependent variables.

Table 5 here: Robustness checks

[17] The indicator, available in the form of a ranking for 178 countries, is a simple average of the regulations affecting ten stages of a business' life: starting a business, dealing with licenses, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts and closing a business. Being quantitative rather than subjective, the indicator is less subject to bias than the more-widely used indicators of governance. The *Doing Business* methodology has limitations. Other areas important to business—such as a country's proximity to large markets, the quality of its infrastructure services (other than those related to trading across borders), the security of property from theft and looting, the transparency of government procurement, macroeconomic conditions or the underlying strength of institutions—are not studied directly by *Doing Business*. To make the data comparable across countries, the indicators refer to a specific type of business—generally a limited liability company operating in the largest business city. We use Doing Business data for 2008 -the fifth annual report- released on June 1, 2008, as it includes more African countries in the sample than reports in previous years. Indeed, for instance, DB 2006 coverage is limited as only 6 out of the 22 African countries are incorporated. Yet, for these six countries, the relative ranking of DB 2008 does not change significantly with respect DB 2006

[18] There is much more dispersion in the corresponding coefficient (ρ=-0.17) when data are restricted to sales to the EU. This is not surprising since there was no change in incentives for export sales to the EU during the period and the indicator is only expected to be significant when there is a change in incentives.

Omitted variable bias and measurement error leading to our large estimated values could have resulted from not separating knitted (CH-61) and non-knitted apparel (CH-62) and from omitting an index of importer j's real exchange rate. As the path of CH-61 and CH-62 were very similar (see figure A2 in appendix A), it is not surprising that a dummy variable distinguishing between the two was not significant. Adding a variable to capture the effects of fluctuations in the $/€ real exchange rate was also insignificant in spite the strong deprecation of the $ from 0.94 (USD/Euro) at the end of 2000, to 1.05 at the end of 2002, and to 1.36 at the end of 2004.

5. Count model estimates

To further explore the incidence of the SR on the growth of apparel exports at the extensive margin (i.e. into new products rather than expanding the volume of existing export products at the intensive margin), we estimate the relationship between, η_t^{ij}, the variable measuring the number of apparel varieties at the HS-6 digit level being exported by country i to country j at time t, and a set of regressors that include the preferential tariff and the SR dummy.

Estimation issues. The count nature of the dependent variable combined with the panel structure of the sample requires special treatment. Suppose that, conditional on a matrix of regressors, Z_t^{jk}, our variable of interest η_t^{jk}, the number of varieties exported from country j to country k at time t , follows a Poisson distribution with parameter $\lambda_t^{jk} = Z_t^{jk}\beta$, leading to the Poisson regression model (PRM):

$$E\left(\eta_t^{jk} \mid Z_t^{jk}\right) = \exp\left(Z_t^{jk}\beta\right) \qquad (1.7)$$

Figure 4a shows the kernel density estimates of the number of exported apparel per exporter (the 22 African countries) and importer (EU and US) lines pooled over countries and years (396 observations). It is right-skewed, suggestive of a Poisson distribution. Figure 4b displays the estimated kernel densities of exported varieties when observations are broken down along export destination and along the date of entry of the AGOA-SR entry into force, with the exclusion of Madagascar, the outlier (including Madagascar does not change the general pattern except fot a longer tail). As expected, the mass of the distribution is displaced to the left when the SR entered into force, implying that more varieties were exported, on average, to each market. This transfer is more accentuated for varieties exported to the US than varieties exported to the EU.

Figure 4.a and 4b here: Kernel densities estimates by Country and period

Under the assumption of a Poisson distribution, the conditional mean and density of η_t^{jk} given Z_t^{jk} are given by $E\left(\eta_t^{jk} \mid Z_t^{jk}\right) = \lambda_t^{jk}$ and by $f\left(\eta_t^{jk} \mid Z_t^{jk}, \beta\right) = \dfrac{\exp(-\lambda_t^{jk})\left(\lambda_t^{jk}\right)^{\eta_t^{jk}}}{\left(\eta_t^{jk}\right)!}$, respectively.

Thus, β, can be estimated by maximizing the log-likelihood function :

$l(\beta)=\sum_j\sum_k\sum_t \eta_t^{jk} Z_t^{jk}\beta-\exp\left(Z_t^{jk}\beta\right)$ that ignores the factorial term as it does not depend on the parameters and uses computer power.

In panel data, heterogeneity between individuals (here importer-exporter pairs) calls for either random-effects (RE) or fixed-effects (FE) specifications.[19] In the former, the parameter of the Poisson distribution is assumed to be itself a random variable of the form $\widetilde{\lambda_t^{jk}}=\delta_{jk}\lambda_t^{jk}$, where δ_{jk} is a random importer-exporter -specific effect with a gamma distribution. Thus, if $\lambda_t^{jk}=\exp\left(Z_t^{jk}\beta\right)\ \left(=E\left(\eta_t^{jk}\mid Z_t^{jk}\right)\right)$ as before, and $\delta_{jk}=\exp\left(c_{jk}\right)$ for some random variable c_{jk}, then $\widetilde{\lambda_t^{jk}}=\exp\left(c_{jk}+Z_t^{jk}\beta\right)$. In the fixed-effects (FE) specification, the individual effect c_{jk} is taken as non-stochastic and the estimation is conditioned on the sum of the counts for each importer-exporter pair, $\sum_t \eta_t^{jk}$, which is itself a Poisson variable.

By assumption the Poisson regression model (PRM) requires the mean and variance of the count distribution to be identical, which is rarely the case. In practice the model underestimates the amount of dispersion in the outcome, a characteristic called *over-dispersion*. In case of over-dispersion, estimates from the Poisson regression model (PRM) are inefficient with standard errors biased downward. To address it, the negative binomial regression model (NBRM) is employed. The NBRM generalizes the Poisson model by re-parametrizing the Poisson parameter $\widehat{\lambda_t^{jk}}$ as a random variable following a gamma distribution with parameters $\lambda_t^{jk}=\exp\left(Z_t^{jk}\beta\right)$ and θ, so that $E\left(\eta_t^{jk}\right)$ remains equal to λ_t^{jk} but the variance is now equal to $Var\left(\eta_t^{jk}\right)=\lambda_t^{jk}+\left(1/\theta\right)\left(\lambda_t^{jk}\right)^2$.[20]

As the PRM can be retrieved as a special case of the NBRM when $\theta=0$, a way of testing for over-dispersion is to estimate the NBRM and then test the hypothesis $\theta=0$ using a Wald or likelihood ratio test. Anticipating on the results, we found over-dispersion and accordingly used the NBRM estimator.[21] Under a RE specification, θ_{jk} is itself assumed to be a random variable with $1/\left(1+\theta_{jk}\right)$ following a beta distribution. Under a FE specification, θ_{jk} is non-random and the joint probability of the counts is as before, conditioned on their total by individual.

Results. Pooled FE and RE Poisson estimates are reported in table 6. Almost all coefficients have the expected signs, with the exception of ln(GDP) in regression 3 which is not significant

[19] Hausman, Hall and Griliches (HHG 1984) is the seminal paper on count-data analysis for panels. Also see Cameron and Trivedi (1998).
[20] For further discussion, see e.g. Cameron and Trivedi (1986) or Allison and Waterman (2002). Note that here $\widehat{\lambda_{it}}$ follows a gamma distribution whereas in the FE Poisson model it was c_{jk} that followed a gamma distribution.
[21] The last row in table 6 reports the chi-2 and p-value for the overdispersion test using the pooled NBRM, as explained below.

at the 10% level of confidence. All estimated coefficients in all regressions are robust to different specifications.

Table 6 here: Count model estimates

The count model estimates can be used to estimate the effect of a one unit increase in the dummy on the percentage change of the expected count of exported varieties, which is equal to $\exp\left(\widehat{\beta_R}\right) \quad \left(= E\left(\eta_t^{jk} \mid R_{i,t}^{j,k}=1\right) / E\left(\eta_t^{jk} \mid R_{i,t}^{j,k}=0\right)\right)$, where $\widehat{\beta_R}$ is the estimated coefficient of the SR dummy[22]. According to these estimates, the percentage increase in the number of apparel varieties exported following the implementation of the AGOA SR ranges between a minimum of 39%(=exp(0.33)-1) and a maximum of 61%(=exp(0.48)-1). Because the number of varieties exported by these African countries is small compared to the total universe of varieties that can be exported, these counterfactual estimates are plausible.

6. Conclusions

This paper has tried to quantify the effect on exports of loosening a particularly costly PSRO for apparel, the so-called 'double transformation' rule. This rule requires that apparel has to be produced from qualifying yarn, essentially yarn coming from the preference-grantor, i.e. the EU or the US implying a double transformation in the beneficiary country since that qualifying yarn has first to be woven into fabric, and then the fabric has to be cut and made-up into clothing. As explained in the introduction, the relaxation of this rule by the US to the so-called "Special Regime" (SR) under AGOA for a group of SSA countries provides a benchmark against which the effect of this PSRO can be evaluated.

Our study of the effects associated with the passage to the SR under AGOA leads to several conclusions. First, taking advantage of this quasi-natural experiment setting whereby exports from SSA to the EU and the US approximately benefited from the same preferential margin of 10% in both markets under EBA and AGOA, and controlling for other factors, we found that AGOA's (SR) was associated with an increase in apparel exports from the seven main exporters by about 300%. This is about three times as much as the estimate of the effects of the tariff removal on SSA exports estimated as a 96% increase in exports. None of the coefficients for unobserved year-specific effects, time-dummies were significant suggesting, at first sight, the absence of misspecification. While the split in export increase between the SR and tariff reduction effects cannot be expected to have been estimated with robustness given the quality of the data, it is nonetheless noteworthy since a more standard evaluation based solely on the high utilization rates of preferences would erroneously conclude that the special ("double

[22] In general, a common way of interpreting coefficients is to focus on the percentage change in the expected count for a δ -change in one of the regressors, say z^{jk} . From (1.7) and letting β_z be the estimated coefficient of z^{jk} , the percentage change in the expected count is equal to : $\dfrac{E\left(\eta^{jk} \mid Z^{jk}, z^{jk}+\delta\right) - E\left(\eta^{jk} \mid Z^{jk}, z^{jk}\right)}{E\left(\eta^{jk} \mid Z^{jk}, z^{jk}\right)} = \exp\left(\beta_z \times \delta\right)$

transformation" requirements) in T&A had little effects since utilization rates remained high for exports to both destinations.

Secondly, the detailed analysis at the product level revealed that less restrictive RoO are associated with an expansion of the range of exported apparel, in the 30%-60% range. Indeed, under preferential market access, more lenient RoO diminish costs for exporters and might have encouraged export diversification or exports growth at the extensive margin. While export diversification also took place for sales to the EU market, to our knowledge, this is the first evidence suggesting that restrictive PSRO are likely to hamper export diversification.

Third, the results suggest learning effects. With respect to the dynamic effects of AGOA's SR, we found evidence that the uptake of preferences is gradual over time, taking place during the first three years a country benefits from the SR.

Finally, the impact of the AGOA SR was different across countries. Since the SR was not introduced in the same year for all countries, these results are strongly suggestive that differences in RoO accounted for differences in performance. However because we could not control for factors that might have influenced supply response (e.g. the quality of infrastructure, political and social stability, governance, fiscal policies aiming to attract foreign investment), we could not account for the uneven effects of SR across countries, even though we produced suggestive environment that supply response was conditioned by the business environment (as captured by the doing business indicator of the World Bank).[23]

To conclude, strict RoO have often been justified as a means to support more processing in developing countries by encouraging integrated production within a country, or within groups of countries through various cumulation schemes, as in the case of T&A. However, at least in the case of T&A, for the low-income countries of SSA, the double-transformation requirement has discouraged developing exports at the intensive and the extensive margins. In sum, the results in this paper suggest that development-friendly policies consistent with the spirit of granting preferential access to low-income countries would benefit from relaxing the stringency of RoO requirements..

[23] For instance, Lesotho, one of the successful exporters, managed to attract foreign investment in the textiles industry by offering a low corporate tax and further tax concessions for locating factories in towns outside Maseru, the capital. Furthermore, the political and social environment was felt by foreign investors as more stable after a period of political instability. The result was a sudden increase in foreign investment mainly originating from Asia and Lesotho became one of the largest exporters to the US among countries eligible to the AGOA-SR. For an early account on the successful case of Lesotho, see: "Lesotho seen as gateway to US market: Trade agreements have eased access for investors and helped diversify employment opportunities for locals" August 23, 2001. Financial Times.

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Tables and figures to

Rules of Origin, Preferences and Diversification in Apparel: African Exports to the US and to the EU

by

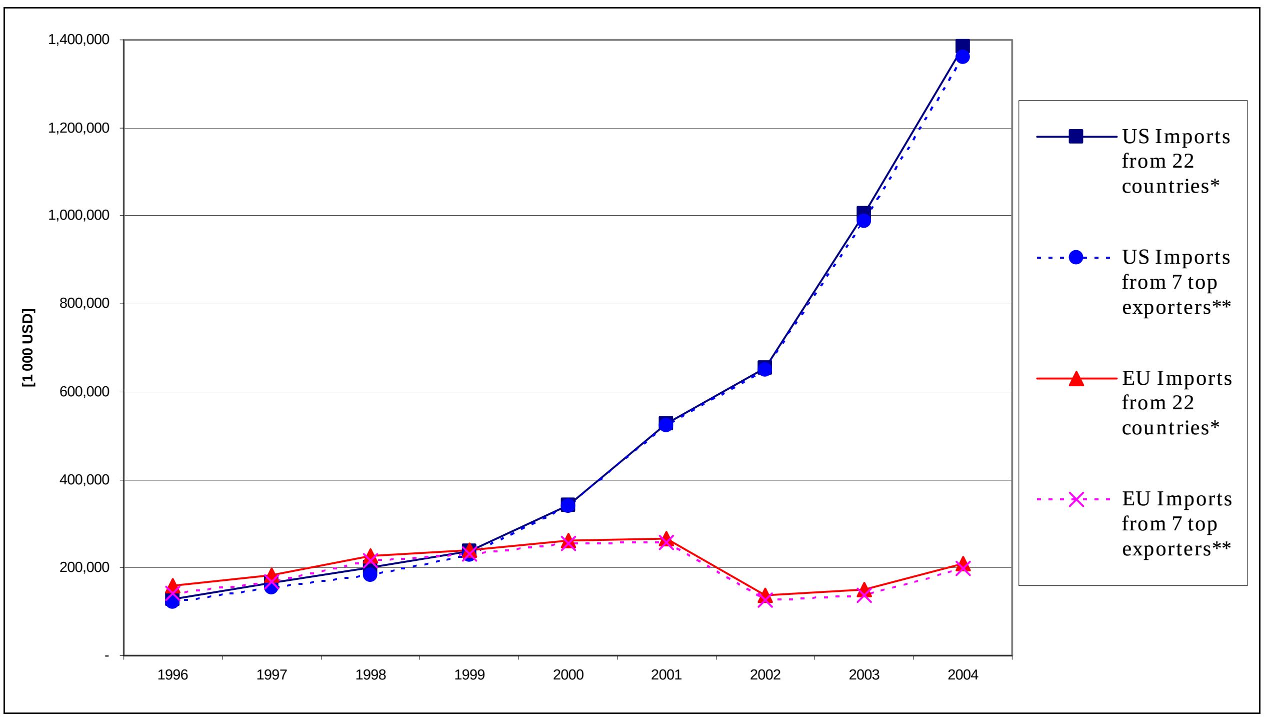
Jaime de Melo

and

Alberto Portugal-Perez

Figure 1(a)

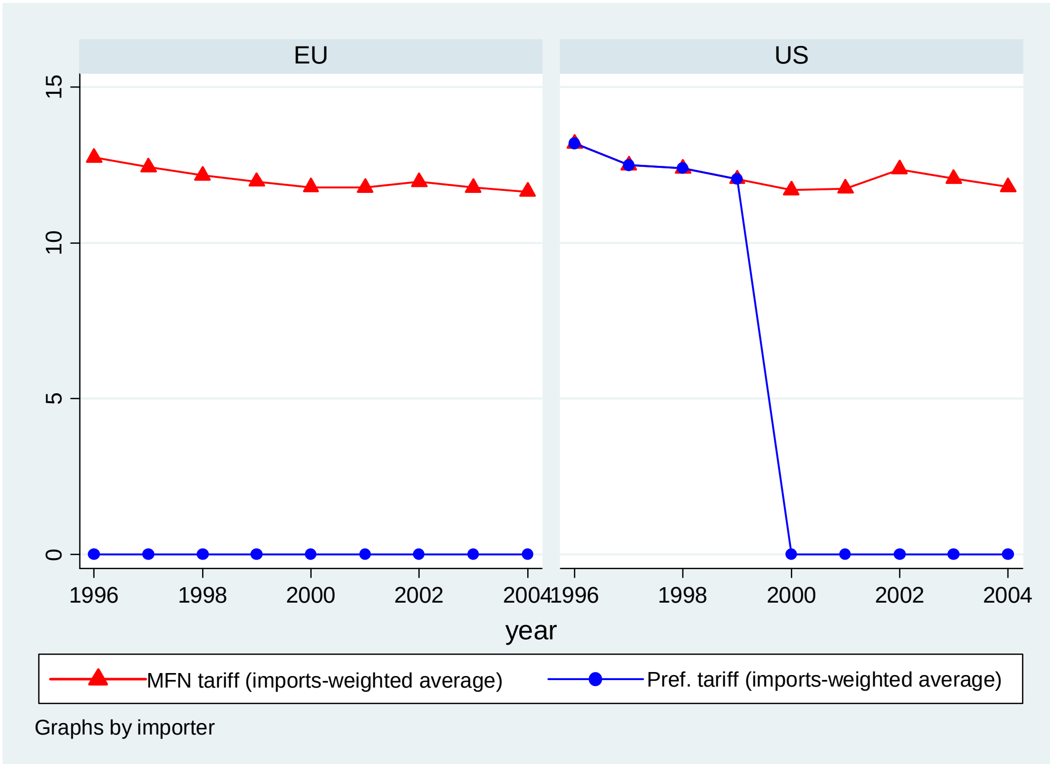
Apparel exports of 22 countries benefiting from AGOA-SR by 2004



*The 22 Sub Saharan countries benefiting from AGOA-SR by 2004 as well as ACP are: Benin, Botswana, Cameroon, Cape Verde, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Swaziland, Tanzania, Uganda, and Zambia. *The top 7 exporters are : Botswana, Cameroon, Ghana, Kenya, Lesotho, Madagascar, Namibia, Nigeria, and Swaziland

Source: Author's calculations on data from WTO Integrated Data Base.

Figure 1(b)
Preferential margins to the US and EU markets



Note:

Preferential tariffs applied by the US are set equal to the MFN tariff prior to the implementation of AGOA and set equal to zero once it is implemented

Figure 3

Variety of apparel exported by the 6 largest exporters to the US

(vertical axis: number of tariff lines with positive exports)

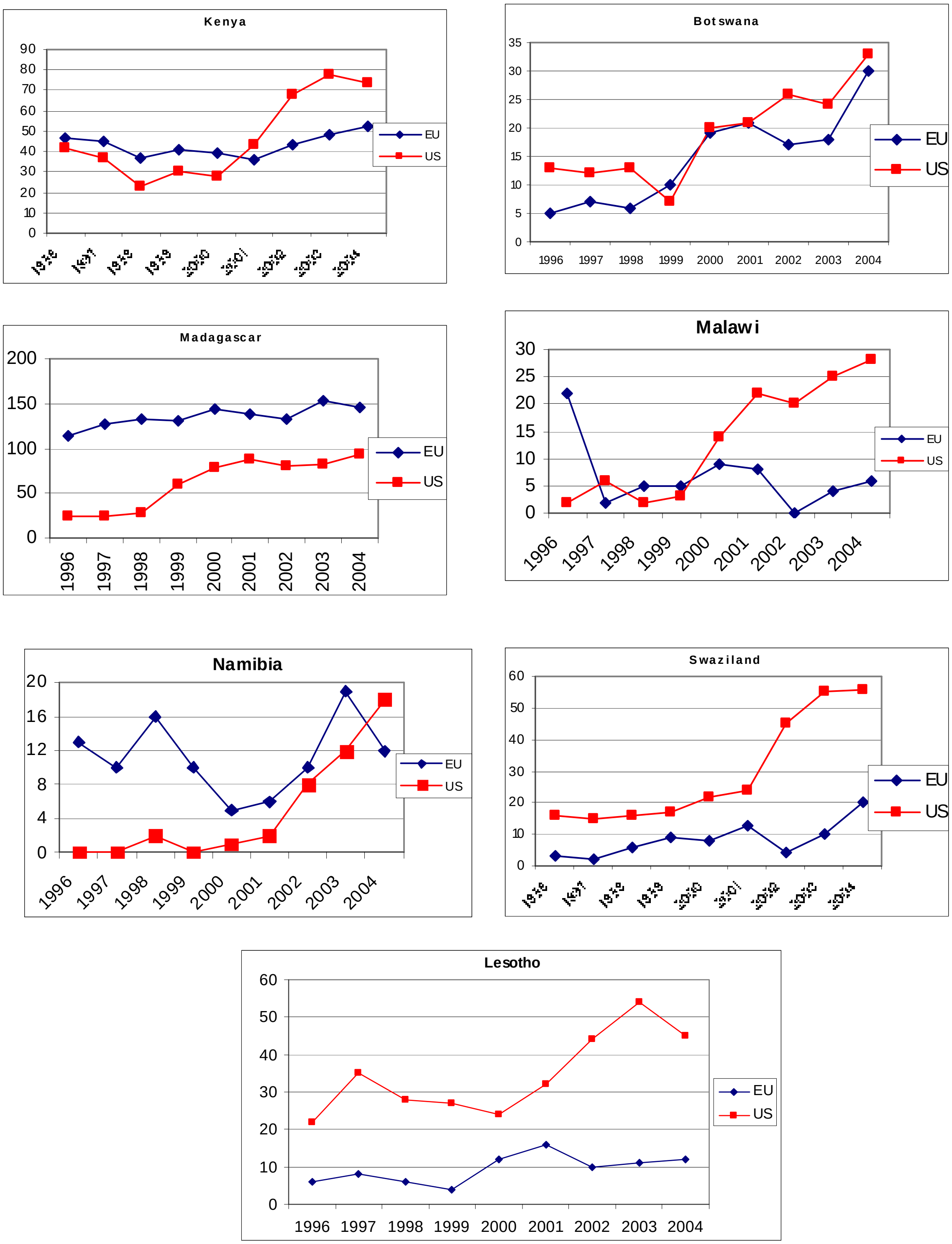
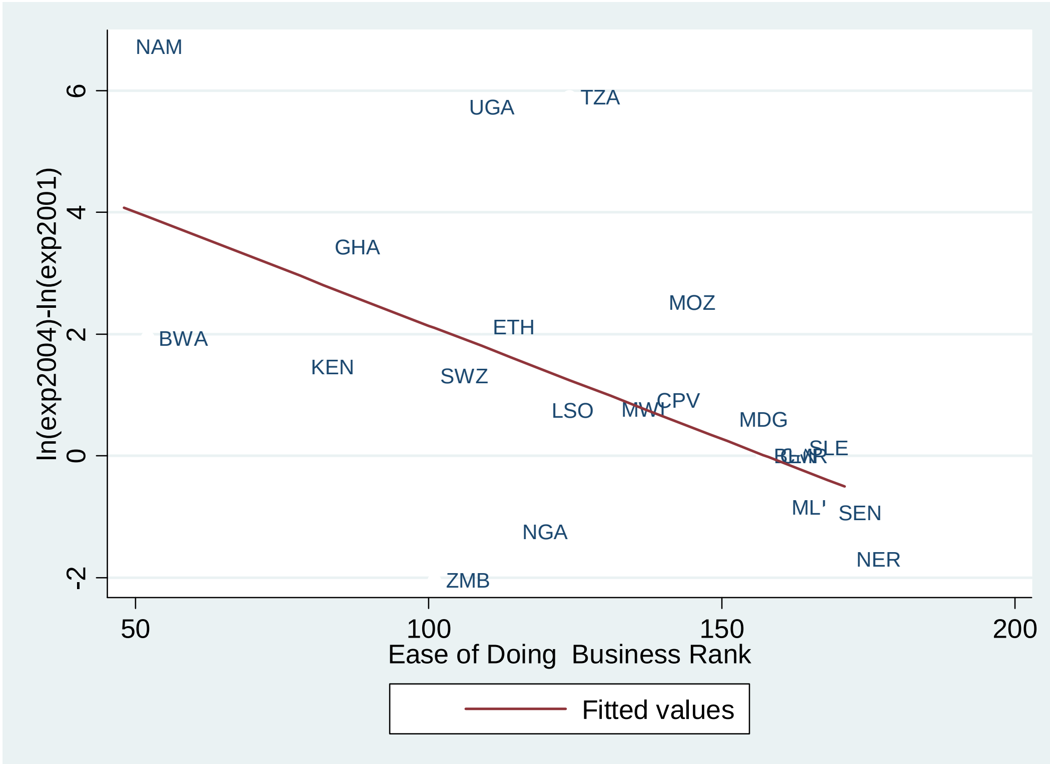


Figure 3: Export Growth and Business Environment



Notes: A higher indicator value in the DB rank indicates a less favorable environment

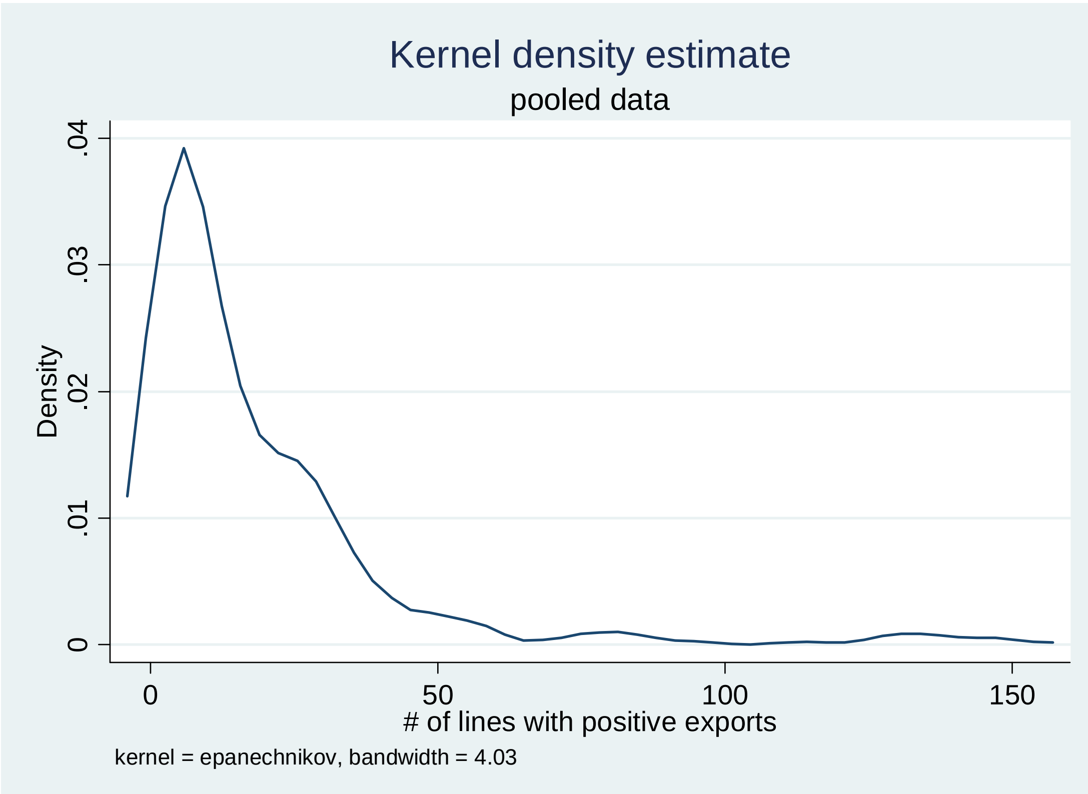
Fitted values for the regression line in the figure are (standard errors in parenthesis):

Ln(exp04)-ln(exp01)=5.86 - 0.37(DB_rank)

(1.61) (0.12)

N:21 obs. Adj R-squared = 0.2766

Figures 4.a and 4b



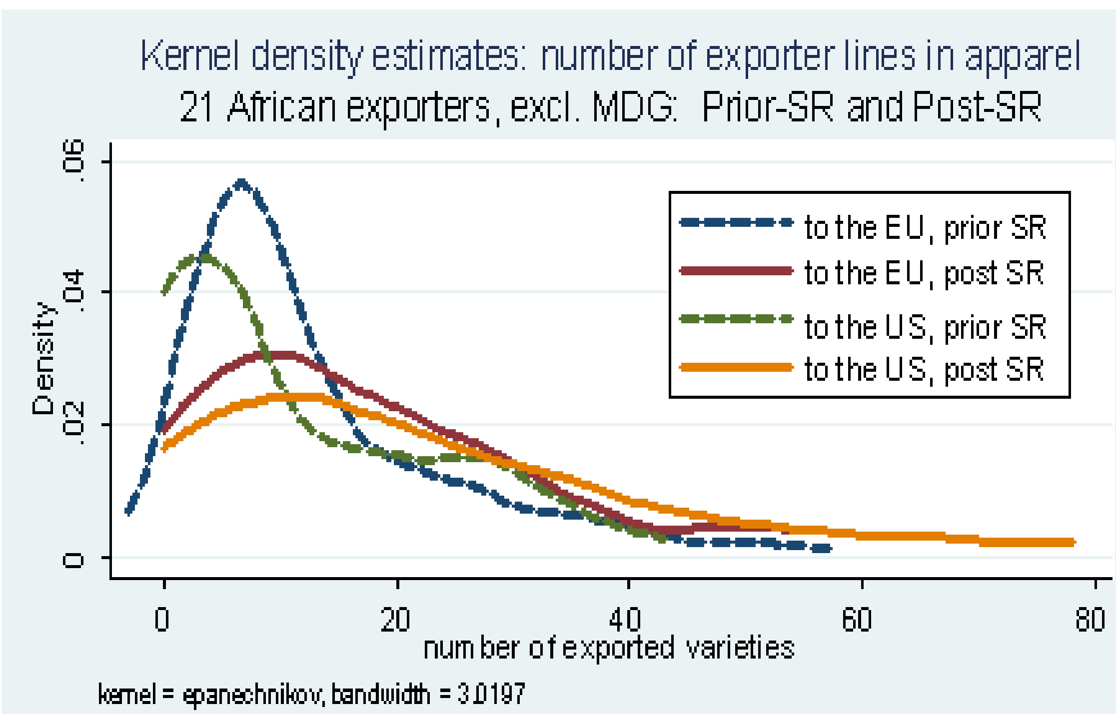


Table 7.
Countries benefiting from AGOA's Special Rule (SR) in 2004

		Exports to the EU in 2004[a]			Exports to the US in 2004[a]			AGOA Apparel provision date[b]
		[1'000 USD]	share	Utilizat. rate	[1'000 USD]	share	Utilizat. rate	
1	Madagascar	179,732.01	85.77%	96.83%	323,323	23.34%	97.27%	01-Mar
2	Lesotho	1,049.13	0.50%	24.49%	455 935	32.92%	98.18%	01-Apr
3	Kenya	3,225.09	1.54%	92.53%	277,173	20.01%	97.94%	01-Jan
4	Swaziland	1,102.20	0.53%	1.75%	178,603	12.90%	98.34%	01-Jul
5	Namibia	97.39	0.05%	72.95%	78,654	5.68%	96.50%	01-Dec
6	Botswana	12,596.03	6.01%	74.67%	20,252	1.46%	99.44%	01-Aug
7	Malawi	122.66	0.06%	94.52%	26,775	1.93%	95.17%	01-Aug
8	Cape Verde	5,097.78	2.43%	99.77%	3,005	0.22%	95.03%	02-Aug
9	Ghana	139.43	0.07%	82.22%	7,368	0.53%	96.26%	02-Mar
10	Tanzania	3,779.38	1.80%	99.53%	2,546	0.18%	99.00%	02-Feb
11	Ethiopia	708.86	0.34%	97.24%	3,335	0.24%	99.80%	01-Aug
12	Uganda	4.29	0.00%	9.48%	4,009	0.29%	100.00%	01-Oct
13	Mozambique	174.27	0.08%	94.70%	2,233	0.16%	85.15%	02-Feb
14	Sierra Leone	787.56	0.38%	4.04%	1,477	0.11%	0.00%	04-Apr
15	Cameroon	353.53	0.17%	23.10%	230	0.02%	0.00%	02-Mar
16	Senegal	356.48	0.17%	93.90%	11	0.00%	0.00%	02-Apr
17	Nigeria	87.12	0.04%	1.67%	76	0.01%	1.37%	04-Jul
18	Mali	55.24	0.03%	10.49%	12	0.00%	0.00%	03-Dec
19	Niger	58.69	0.03%	82.09%	6	0.00%	0.00%	03-Dec
20	Zambia	4.94	0.00%	100.00%	28	0.00%	78.67%	01-Dec
21	Benin	18.29	0.01%	41.97%	2	0.00%	0.00%	04-Jan
22	Rwanda	4.94	0.00%	30.23%	1	0.00%	0.00%	03-Mar
	TOTAL	209,555	100%	**91.20%**	1,385,053	100%	**97.65%**	

Notes:
Source: Authors' calculations from COMTRADE data. Countries ranked by decreasing order of combined total apparel exports to the US and to the EU.
a) The utilization rate of preferences is defined as the percentage of imports entering into a country on a preferential basis with respect to total imports. The figure on utilization rates for EU preferences in 2004 was obtained from EUROSTAT. Utilization rates for US preferential schemes can be more easily obtained since USITC collects and makes available the program under which imports enter the US.
b) Date of entry into force of AGOA SR (year, month)

Table 8
Event-Analysis-based aggregate growth of Apparel to the US market

	1	2	3	4	5	6
Dependent Variable	$\ln(Y_{jt})$	$\ln(Y_{jt})$	$\ln(Y_{jt})$	$\ln(Y_{jt})$	$\Delta\ln(Y_{jt})$	$\Delta\ln(Y_{jt})$
Year (α_1)		0.22 [0.05]***		0.44 [0.08]***		
SR (β_1)	1.4 [0.29]***		2.21 [0.50]***			
SR (γ_1)					0.58 [0.31]*	0.64 [0.28]**
Constant	3.53 [0.70]***	4.36 [0.72]***	8.18 [0.29]***	9.37 [0.25]***	0.45 [1.21]	0.05 [0.17]
Observations	177	177	177	177	146	146
R-squared	0.76	0.76	0.1	0.13	0.1	0.04
Sample (# countries)	22	22	22	22	22	22
Exporter-spec dummies	Yes	Yes	No	No	Yes	No

Notes
Standard errors in brackets. *significant at 10%; ** significant at 5%; *** significant at 1%

Table 9
Elasticity of Exports to Changes in RoO

	1	2	3	4		5
				4a	4b (Prob Uncens.)	
Dependent variable	**ln(X (>0))**	**ln(1+X)**	**ln(1+X)**	**ln(a_v+X)**		**X**
Independent Variables (a)	**OLS**	**OLS**	**Tobit**	**ET-Tobit**		**PPML**
$R_{i,t}^{j,k}$ **(>0)**	1.05 [0.18]***	0.87 [0.09]***	4.51 [0.59]***	1.59 [0.19]***	0.059 [0.005]***	0.84 [0.24]***
$VC_{i,t}^{j,k}$ **(>0)**	-0.24 [0.16]	0.45 [0.09]***	2.98 [0.62]***	0.81 [0.20]***	0.027 [0.006]***	-0.36 [0.22]
$t_{i,t}^{k,mfn}$ **(>0)**	0.05 [0.01]***	0.06 [0.01]***	0.34 [0.04]***	0.11 [0.01]***	0.003 [0.000]***	-0.01 [0.01]
$t_{i,t}^{j,k,pref}$ **(<0)**	-0.01 [0.01]	-0.04 [0.01]***	-0.26 [0.04]***	-0.08 [0.01]***	-0.002 [0.000]***	-0.01 [0.02]
$\ln\left(Y_t^k\right)$ **(>0)**	-1 [0.83]	1.23 [0.41]***	12.22 [3.03]***	3.74 [0.96]***	0.11 [0.028]***	4.63 [1.55]***
$D_i^{Madag-02}$ **(<0)**	-0.23 [0.19]	-0.21 [0.18]	-1.54 [0.87]*	-0.55 [0.27]**	-0.015 [0.008]*	-0.6 [0.25]**
a_v (>0)				4727.39 [309.25]***		
Observations	3896	28854	28854	28854		28854
R^2 or Pseudo R^2 *(b)*	0.2	0.19	0.27	0.27		
Approx change in exports	185.8%	138.7%	8992.2%	390.4%		84%
Sample	**AGOA Top 7**	**AGOA Top 7**	**AGOA Top 7**	**AGOA Top 7**		**AGOA Top 7**

Notes:
(a) Expected signs from expression (1.5) in parenthesis.
Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%
All estimates include a constant, exporter dummies as well as interaction terms between exporter-dummies and EU-dummies.
(b) R^2 are reported for OLS regressions and McKelvey and Zavoina's Pseudo R^2 are reported for Tobit and ET-Tobit regressions.

Table 10
Temporal and country-specific effects of the SR

	1		2	
Dependent variable	$\ln(a_v+X)$		$\ln(a_v+X)$	
Independent variables	ET-tobit		ET-tobit	
	1a Coeff.	1b Approx change in exports (b)	2 Coeff.	2b Approx change in exports (b)
$R_{i,t}^{j,k}$	1.05 [0.23]***	185.77%		
$R2_{i,t}^{j,k}$	0.62 [0.25]**	85.89%		
$R3_{i,t}^{j,k}$	0.42 [0.24]*	52.20%		
$R4_{i,t}^{j,k}$	-0.02 [0.27]	-1.98%		
$D_i^{Bot} \times R_{i,t}^{j,k}$			0.57 [0.40]	76.83%
$D_i^{Ken} \times R_{i,t}^{j,k}$			1.9 [0.32]***	568.59%
$D_i^{Les} \times R_{i,t}^{j,k}$			0.39 [0.33]	47.70%
$D_i^{Mad} \times R_{i,t}^{j,k}$			1.7 [0.31]***	447.39%
$D_i^{Mala} \times R_{i,t}^{j,k}$			2.39 [0.47]***	991.35%
$D_i^{Nam} \times R_{i,t}^{j,k}$			1.8 [0.36]***	504.96%
$D_i^{Swa} \times R_{i,t}^{j,k}$			4.69 [0.80]***	10785.32%
Observations	28854		28854	
Pseudo R^2 (a)	0.27		0.3	
Sample	**AGOA Top 7**		**AGOA Top 7**	

Notes: Estimates include a constant and other dependent variables that are not reported here , exporter dummies as well as interaction terms between exporter-dummies and EU-dummies**.** Standard errors in brackets.
*significant at 10%; ** significant at 5%; *** significant at 1%
(a) McKelvey and Zavoina's Pseudo-R^2 are reported.
(b) $\frac{\Delta E\left[X_{it}^{jk} \middle| X_{it}^{jk*}\right]}{\Delta \partial R_{it}^{jk}} \frac{1}{E\left[X_{it}^{jk} \middle| X_{it}^{jk*} > 0, R = 0\right]}$

Table 11

Robustness checks (dependent variable: $\ln(a_v+X)$)

	1	2	3	4
	ET-Tobit	**ET-Tobit**	**ET-Tobit**	**ET-Tobit**
$R_{i,t}^{j,k}$ (>0)	1.59 [0.19]***	1.33 [0.14]***	2.15 [0.27]***	1.45 [0.25]***
$VC_{i,t}^{j,k}$ (>0)	0.81 [0.20]***	1.69 [0.14]***	0.61 [0.31]**	0.86 [0.21]***
$t_{i,t}^{k,mfn}$ (>0)	0.11 [0.01]***	0.06 [0.01]***	0.16 [0.02]***	0.12 [0.01]***
$t_{i,t}^{j,k,pref}$ (<0)	-0.08 [0.01]***	-0.08 [0.01]***	-0.07 [0.02]***	-0.1 [0.02]***
$\ln\left(Y_t^k\right)$ (>0)	3.74 [0.96]***	1.87 [0.68]***	4.31 [1.44]***	4.19 [5.22]
$D_i^{Madag-02}$ (<0)	-0.55 [0.27]**	-0.46 [0.31]		-0.14 [0.32]
d_1997				-0.2 [0.28]
d_1998				-0.43 [0.42]
d_1999				-0.29 [0.59]
d_2000				-0.5 [0.75]
d_2001				-0.76 [0.78]
d_2002				-0.77 [0.84]
d_2003				-0.26 [0.94]
d_2004				-0.1 [1.13]
a_v (>0)	4727.39 [309.25]***	1,005.13 [43.23]***	3,701.00 [338.97]***	4,734.49 [309.64]***
Observations	28854	90684	24732	28854
Pseudo R^2 (a)	0.27	0.26	0.17	0.27
Approx. Change in exports	390%	278%8	758%	326%
Sample	**AGOA Top 7**	**AGOA 22**	**AGOA TOP 6-Excl. MDG**	**AGOA Top 7**

Notes:
Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
All estimates include a constant, exporter dummies as well as interaction terms between exporter-dummies and EU-dummies.
(a) R2 are reported for OLS regressions and McKelvey and Zavoina's Pseudo R2 are reported for Tobit and ET-Tobit regressions.

Table 12
Count model estimates: Negative Binomial Regression Model

	-1	-2	-3	-4	-5
	pooled	pooled	pooled	FE	RE
$R_{i,t}^{j,k}$ (>0)	0.33 [0.15]**	0.36 [0.08]***	0.4 [0.12]***	0.48 [0.09]***	0.47 [0.09]***
$t_t^{k,mfn}$ (<0)	-0.03 [0.01]***	-0.03 [0.01]***	-0.03 [0.01]***	-0.02 [0.01]***	-0.02 [0.01]***
$\ln\left(Y_t^k\right)$ (>0)			-0.19 [0.36]		
Constant	2.93 [0.07]***	1.56 [0.16]***	7.15 [10.66]	1.97 [0.14]***	2 [0.14]***
Observations	396	396	396	396	396
Number of groups (importer-exporter pairs)				44	44
Fixed exporter-spec effects	No	Yes	Yes	Yes	No
Test of overdispersion (H0 : $\theta = 0$)					
Chi-2	6522.81	749.56	748.99		
p-value	0	0	0		

Notes:
Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendices to

Rules of Origin, Preferences and Diversification in Apparel: African Exports to the US and to the EU

by

Jaime de Melo

and

Alberto Portugal-Perez

November 24, 2008

Appendix A: Additional tables and figures

Table A.1
Event-analysis estimates over a sample of 16 countries

	1	2	3	4	5	6
Dependent Variable	$\ln(Y_{jt})$	$\ln(Y_{jt})$	$\ln(Y_{jt})$	$\ln(Y_{jt})$	$\Delta\ln(Y_{jt})$	$\Delta\ln(Y_{jt})$
Year		0.2 [0.05]***		0.44 [0.09]***		
SR	1.2 [0.27]***		2.19 [0.55]***		0.49 [0.25]*	0.48 [0.28]*
Constant	12.35 [0.51]***	7.76 [0.52]***	8.56 [0.31]***	9.76 [0.27]***	0.02 [0.15]	0.1 [0.53]
Observations	144	144	144	144	128	128
R-squared	0.81	0.81	0.1	0.15	0.03	0.06
Sample (# countries)	16	16	16	16	16	16
Exporter-spec dummies	Yes	Yes	No	No	Yes	No

Standard errors in brackets. *significant at 10%; ** significant at 5%; *** significant at 1%

Table A2
Sample and Descriptive statistics

The sample has potentially 90,684 observations (=229 x 22 x 2 x 9) from which 83523 have zero-export values, i.e. about 92 percent of exports observations have zero values. Tariff lines 611011, 611012, and 611019, were excluded from the set of varieties because there are no exports from any country before 2002. .The same applies to tariff line 611010 for which there are no exports after 2001. We suspect that this pattern might have reflected a change in the tariff classification with the latter line been disaggregated in the three former categories. Three tariff lines (610799, 611699, and 620321) that are imported by the EU and US from other-than-African sources were also omitted from the sample.

Below is a summary of the number of years with zero aggregate exports to the EU and to the US, respectively, in parenthesis (maximum: 9 years). Benin (0,3); Botswana (0,0); Cameroon (0,0); Capo Verde (0,0); Ethiopia (0,0); Ghana (0,0); Kenya (0,0); Lesotho(0,0) ; Madagascar(0,0); Mali (0,0); Mozambique (0,1); Malawi (1,0); Namibia (0,3); Níger (0,0); Nigeria (0,0);Rwanda (2,7); Senegal (0,0); Sierra Leone (0,0); Swaziland (0,0):Tanzania (0,0); Uganda (0,4); Zambia (1, 3).

For the reduced panel considering the 7 major exporter countries, 24958 observations out of 28854(=229 x 7 x 2 x 9) are zeros, that is 86.5% of observations.

Descriptive Statistics

	TOP 7 exporters (reduced sample)			All 22 countries (full sample)		
Variable	Obs	Mean	Std. Dev	Obs	Mean	Std. Dev
$\ln\left(1+X_{i,t}^{j,k}\right)$	13590	3.158	5.203	33408	2.063	4.181
$\ln\left(1+X_{i,t}^{j,k}\right)$	13590	12.66	4.208	33408	12.47	4.097
$\ln\left(1+X_{i,t}^{j,k}\right)$	13590	3.044	6.3	33408	2.958	6.118
$VC_{i,t}^{j,k}$	13590	0.072	0.259	33408	0.083	0.276
$R_{i,t}^{j,k}$	13590	0.2	0.4	33408	0.161	0.368
$\ln\left(Y_t^k\right)$	13590	29.79	0.122	33408	29.79	0.122

Table A3
Robustness checks on the sample of 22 AGOA-SR countries

	1	2	3	4	5
	OLS[ln(m)>0]	**OLS[ln(1+m)]**	**Tobit**	**ET-Tobit**	**PPML**
$R_{i,t}^{j,k}$ **(>0)**	0.74	0.42	3.31	1.33	0.85
	[0.12]***	[0.03]***	[0.40]***	[0.14]***	[0.24]***
$VC_{i,t}^{j,k}$ **(>0)**	-0.13	0.46	5.21	1.69	-0.41
	[0.10]	[0.04]***	[0.38]***	[0.14]***	[0.22]*
$t_{i,t}^{k,mfn}$ **(>0)**	0.05	0.02	0.12	0.06	-0.01
	[0.01]***	[0.00]***	[0.03]***	[0.01]***	[0.01]
$t_{i,t}^{j,k,pref}$ **(<0)**	-0.03	-0.02	-0.22	-0.08	-0.01
	[0.01]***	[0.00]***	[0.03]***	[0.01]***	[0.01]
$\ln\left(Y_t^k\right)$ **(>0)**	-2.19	0.33	5.24	1.87	4.45
	[0.55]***	[0.15]**	[1.92]***	[0.68]***	[1.48]***
$D_i^{Madag-02}$ **(<0)**	-0.17	0.04	-1.11	-0.46	-0.59
	[0.17]	[0.12]	[0.88]	[0.31]	[0.25]**
a_v (>0)				1,005.13	
				[43.23]***	
Observations	7161	90684	90684	90684	90684
R^2 or Pseudo R^2 (a)	0.41	0.16	0.25	0.26	
Dependent variable	**ln(1+X)**	**ln(1+X)**	**ln(a_v+X)**	**X**	**ln(X)**

Notes:
Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
All estimates include a constant, exporter dummies as well as interaction terms between exporter-dummies and EU-dummies**.**
(a) R^2 are reported for OLS regressions and McKelvey and Zavoina's Pseudo R^2 are reported for Tobit and ET-Tobit regressions.

Table A4

Robustness checks on the sample of top 6 exporters, excluding Madagascar

	1	2	3	4	5
	OLS[ln(m)>0]	**OLS[ln(1+m)]**	**Tobit**	**ET-Tobit**	**PPML**
$R_{i,t}^{j,k}$ **(>0)**	0.96	0.87	6.34	2.15	0.71
	[0.21]***	[0.08]***	[0.85]***	[0.27]***	[0.30]**
$VC_{i,t}^{j,k}$ **(>0)**	-0.93	0.14	2.54	0.61	-1.85
	[0.24]***	[0.09]	[0.95]***	[0.31]**	[0.32]***
$t_{i,t}^{k,mfn}$ **(>0)**	0.06	0.06	0.48	0.16	-0.01
	[0.01]***	[0.01]***	[0.05]***	[0.02]***	[0.01]
$t_{i,t}^{j,k,pref}$ **(<0)**	0	-0.03	-0.22	-0.07	0
	[0.02]	[0.01]***	[0.06]***	[0.02]***	[0.02]
$\ln\left(Y_t^k\right)$ **(>0)**	-0.32	0.87	13.19	4.31	6.35
	[1.14]	[0.39]**	[4.54]***	[1.44]***	[2.44]***
a_v (>0)	19.75	-26.32	-431.82	3,701.00	-179.75
	[34.15]	[11.63]**	[135.52]***	[338.97]***	
Observations	2148	24732	24732	24732	24732
R^2 or Pseudo R^2 (a)	0.32	0.07	0.16	0.17	
Dependent variable	**ln(1+X)**	**ln(1+X)**	**ln(a_v+X)**	**X**	**ln(X)**

Notes:

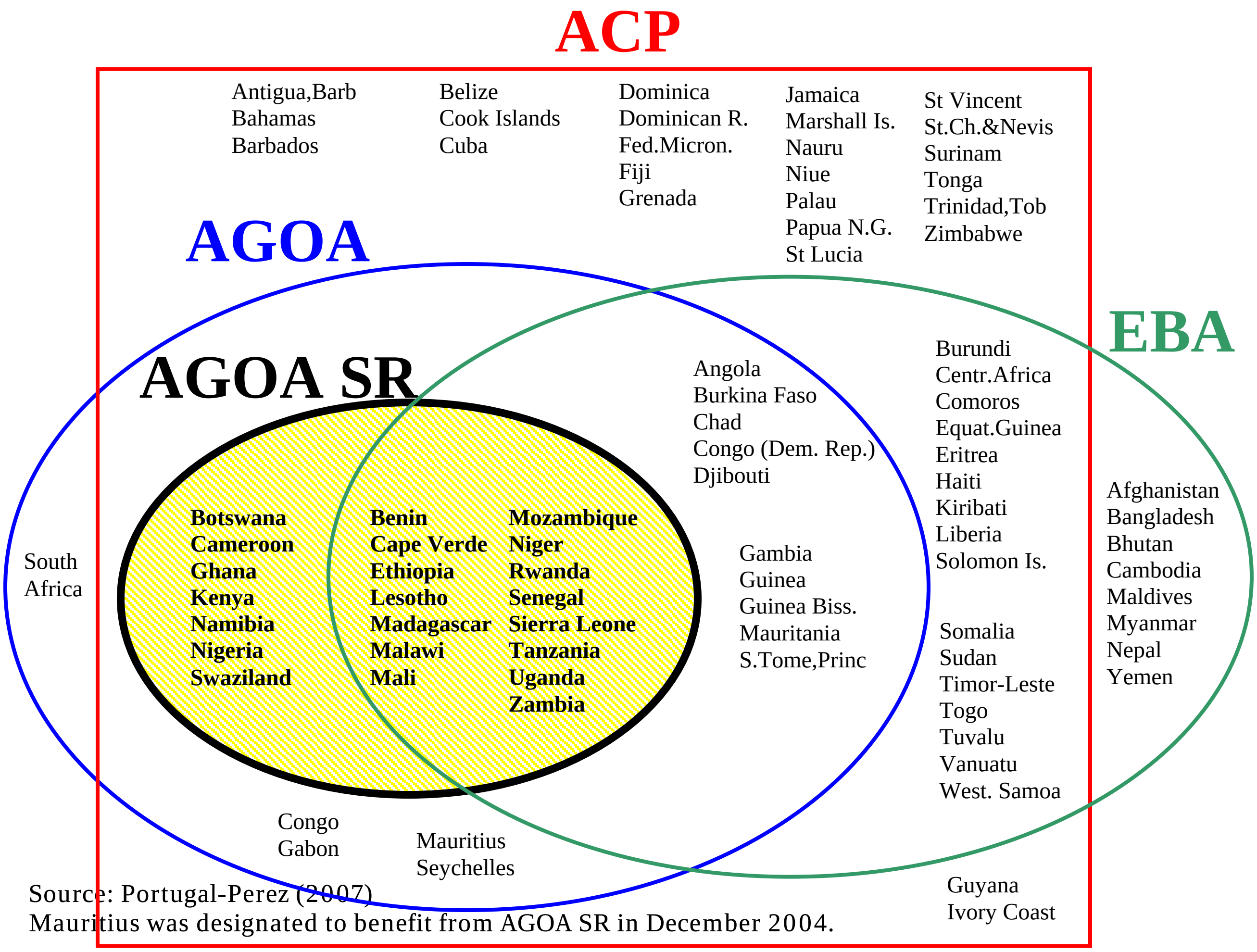
Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

All estimates include a constant, exporter dummies as well as interaction terms between exporter-dummies and EU-dummies.

(a) R^2 are reported for OLS regressions and McKelvey and Zavoina's Pseudo R^2 are reported for Tobit and ET-Tobit regressions.

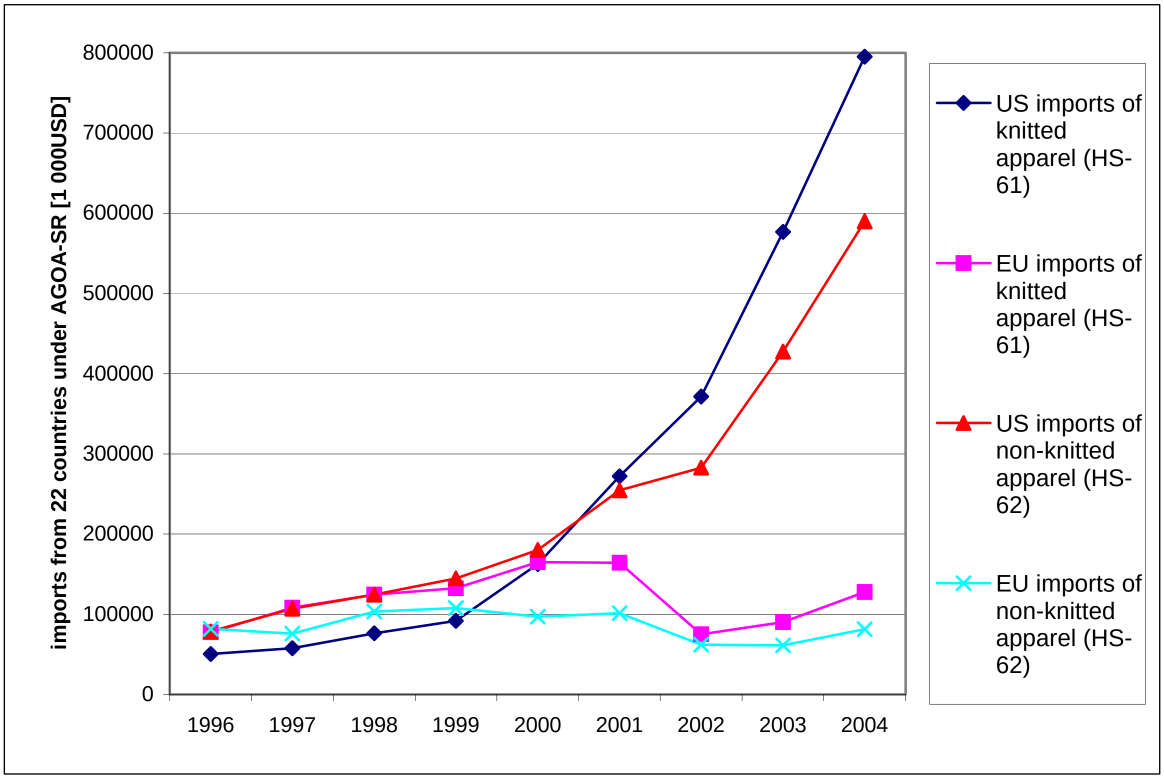
Figure A1:A map of AGOA, ACP and EBA in 2004



Source: Portugal-Perez (2007)
Mauritius was designated to benefit from AGOA SR in December 2004.

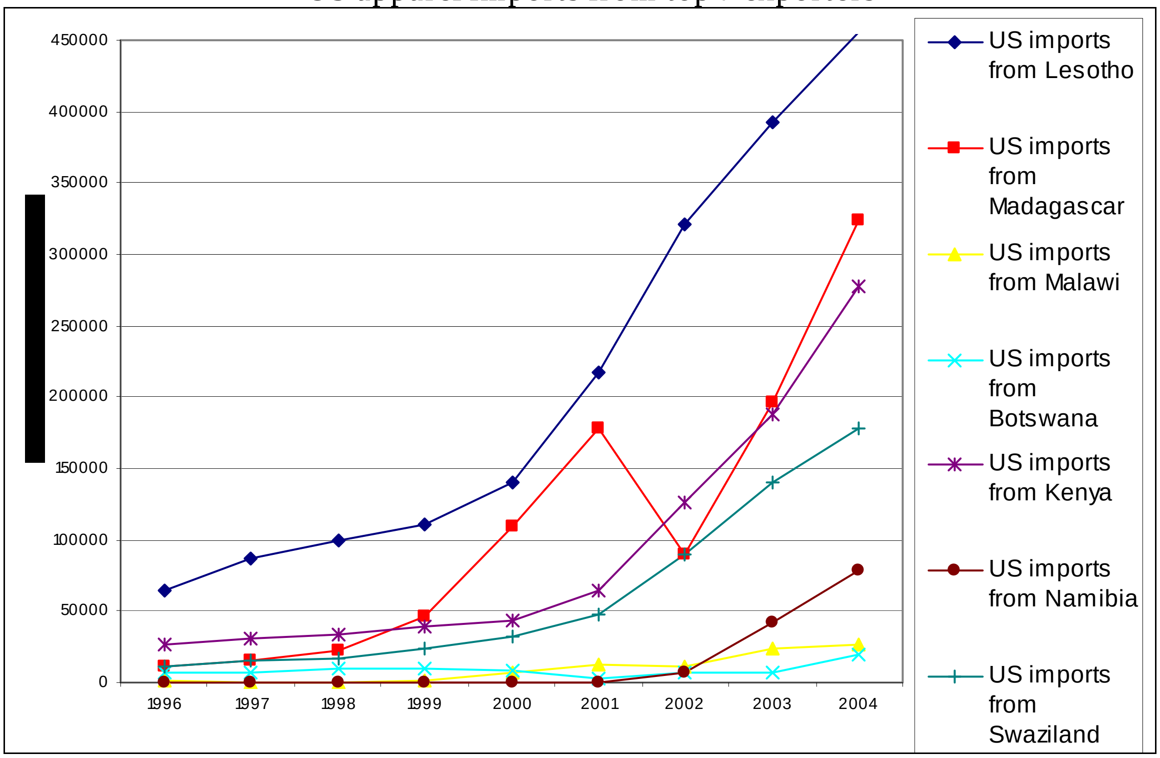
Figure A2

EU and US Imports of knitted (HS-61) and non-knitted (HS-62) apparel



Source: Authors' calculations on data from WTO Integrated Data Base.

Figure A3
US apparel imports from top 7 exporters



Source: Authors' calculations on data from UN COMTRADE and WITS.

Appendix B : Derivation of expression (1.5)

To lighten the notation, let the prices of substitutes, $PS_w^k = P_w^k$. Then profit-maximizing pricing for sellers of African apparel implies:

$$p^k\left(X^k, Y^k, P_w^k\right) + \frac{\partial p^k\left(X^k, Y^k, P_w^k\right)}{\partial X^k} \; X^k = \left(1 + t^{k,pref}\right) \; \left(MC_X^k\right) \tag{1.4}$$

where $p^k(\;)$ is the inverse demand function of country k and $P_w^k = \overline{P^*}\left(1 + t^{k,MFN}\right)$.

Totally differentiating expression (1.4), we obtain:

$$\left\{ \frac{\partial^2 p^k(\;)}{\partial\left(X^k\right)^2} X^k + 2\frac{\partial p^k(\;)}{\partial X^k} - \left(1 + t^{k,pref}\right)\frac{\partial MC_X^k(\;)}{\partial X^k} \right\} dX^k + \left\{ \frac{\partial^2 p^k(\;)}{\partial X^k \partial Y^k} X^k + \frac{\partial p^k(\;)}{\partial Y^k} \right\} dY^k +$$

$$-\left\{MC_X^k(\;)\right\} dt^{k,pref} - \left\{ \left(1 + t^{k,pref}\right)\frac{\partial MC_X^k(\;)}{\partial r} \right\} dr + \left\{ \frac{\partial^2 p^k(\;)}{\partial X^k \partial P_w^k} \overline{P^*} X^k + \frac{\partial p^k(\;)}{\partial P_w^k} \overline{P^*} \right\} dt^{k,MFN} = 0$$

Since we assumed: $\frac{\partial MC_X^k(\;)}{\partial X^k} = 0$, we have :

$$A \times dX^k + B \times dY^k + C \times dt^{k,pref} + D \times dr + E \times dt^{k,MFN} = 0 \tag{A1}$$

Where: $A = \frac{\partial^2 p^k(\;)}{\partial\left(X^k\right)^2} X^k + 2\frac{\partial p^k(\;)}{\partial X^k}$, $B = \frac{\partial^2 p^k(\;)}{\partial X^k \partial Y^k} X^k + \frac{\partial p^k(\;)}{\partial Y^k}$, $C = -MC_X^k(\;)$;

$D = -\left(1 + t^{k,pref}\right)\frac{\partial MC_X^k(\;)}{\partial r}$, and $E = \frac{\partial^2 p^k(\;)}{\partial X^k \partial P_w^k} \overline{P^*} X^k + \frac{\partial p^k(\;)}{\partial P_w^k} \overline{P^*}$.

Then from (A1) :

$A > 0$ if and only if $-\frac{\partial^2 p^k(\;)}{\partial\left(X^k\right)^2} X^k > 2\frac{\partial p^k(\;)}{\partial X^k}$, which is verified, for instance, if we assume a linear demand function , so that $\frac{\partial^2 p^k(\;)}{\partial\left(X^k\right)^2} = 0$.

$B > 0$ if and only if $\frac{\partial^2 p^k(\;)}{\partial X^k \partial Y^k} X^k > \frac{\partial p^k(\;)}{\partial Y^k}$, which is verified, for instance , when we assume that $\frac{\partial^2 p^k(\;)}{\partial X^k \partial Y^k} > 0$.

$C < 0$ and $D < 0$.

$E > 0$ if and only if $\dfrac{\partial^2 p^k(\ )}{\partial X^k \partial P_w^k} X^k > \dfrac{\partial p^k(\ )}{\partial P_w^k}$, which is verified, for instance , when we assume that $\dfrac{\partial^2 p^k(\ )}{\partial X^k \partial P_w^k} > 0$.

Then,

$$\frac{dX^k}{dY^k} = -\frac{B}{A} > 0, \frac{dX^k}{dt^{k,pref}} = \frac{C}{A} < 0, \frac{dX^{EU}}{dr} = \frac{D}{A} < 0 \text{ and } \frac{dX^k}{dt^{k,MFN}} = -\frac{E}{A} > 0$$

Appendix C. Product Specific Rules of Origin in T&A

PTA	Rules of Origin	Legal texts
NAFTA	▪ Rules of origin for T&A are very complex. In order to be eligible for preferential access under NAFTA, most textiles and apparel must be produced, i. e. cut and sewn, in the NAFTA area from yarn also made in a NAFTA country. This is called <u>the triple transformation process.</u> ▪ In the case of cotton and man-made fibre spun yarn, the fibre must originate from North America, i.e. the NAFTA area.	The NAFTA agreement can be found at: http://www.nafta-sec-alena.org/DefaultSite/index_e.aspx?DetailID=78 Rules applying to trade in textiles and apparel goods between NAFTA countries are set out in annex 300-B. All specific rules of origin are detailed in annex 401.
AGOA general regime	▪ AGOA provides quota-free and duty-free treatment to apparel assembled (and/or cut) in one or more beneficiary SSA country from US fabrics, which in turn are made out of US yarn. Apparel articles assembled from fabric formed in beneficiary SSA countries from US yarn or originating in one or more beneficiary sub-Saharan African countries are allowed only in an amount not to exceed an applicable percentage[24] (sec 112). ▪ AGOA allows for diagonal cumulation with respect to other SSA beneficiary countries (sec 112) ▪ Apparel imports made with regional (African) fabric and yarn are subject to a cap of 1.5% of the aggregate square meter equivalents of all apparel articles imported into the US in the preceding 12-month period (section 111), growing proportionally to 3.5% of overall imports over an 8 year period. The amendments to AGOA signed in 2002 (AGOA II) double the applicable percentages of the cap. ▪ The AGOA Acceleration Act (AGOA III), signed in 2004, increases the De Minimis Rule from its current level of 7 percent to 10 percent. This rule states that apparel products assembled in Sub-Saharan Africa which would otherwise be considered eligible for AGOA benefits but for the presence of some fibbers or yarns not wholly formed in the United States or the beneficiary Sub-Saharan African country will still be eligible for benefits as long as the total weight of all such fibbers and yarns is not more than a certain percent of the total weight of the article.	The African Growth and Opportunity Act (AGOA) was signed into law on May 18, 2000 as Title 1 of The Trade and Development Act of 2000. President Bush signed amendments to AGOA (a.k.a. AGOA II) on August 6, 2002 as Sec. 3108 of the Trade Act of 2002. Finally, the AGOA Acceleration Act (AGOA III) was signed by the US President on July 12, 2004. The above mentioned legal texts are integrally downloadable at the website: http://www.agoa.gov/agoa_legislation/agoa_legislation.html

[24] Initially, the applicable percentage is equal to 1.5 percent for the 1-year period beginning October 1, 2000, increased in each of the seven succeeding 1-year periods by equal increments, so that for the period beginning October 1, 2007, the applicable percentage does not exceed 3.5 percent. See Then this applicable percentage has been "doubled" by AGOA II.

AGOA's special regime for Lesser Developed Countries	▪ AGOA grants special ROO to "lesser developed countries". These countries are allowed to use third country fabric and yarn and still qualify for AGOA preferences. In other words, making up fabric into clothing, or -simple transformation process- is sufficient to confer origin. ▪ The special regime for LDCs expires on September 30, 2007 but can be renewed by Congress, as has been previously done.	Sec 112 of the8 AGOA legal text
EU's GSP/EBA and Cotonu (ACP) Agreements	▪ EU rules of origin for apparel require production from yarn. This entails that a double transformation process must take place in the beneficiary country with the yarn being woven into fabric and then the fabric cut and made-up into clothing. ▪ Product specific rules of origin (PSRO) for textiles and apparel under EBA and Cotonou (ACP) are the same. ▪ There are differences in the cumulation schemes between the EBA or GSP and those of the Coutonou Agreement. Under the Cotonou Agreement, there is full cumulation among African countries, so that regional fabrics can be used without losing originating status. Under the GSP there is more limited partial or diagonal cumulation that can only take place within four regional groupings: ASEAN, CACM, the Andean Community and SAARC but not amongst ACP countries[25]. Therefore, LDC countries members to ACP who are also eligible to export to the EU under the EBA may, and often do, prefer to continue exporting under ACP, in part, due to the more liberal RoO existing under the latter. The ACP agreement attaches extensive conditions to cumulation with non-ACP countries as well as South Africa (see Annexes IX-XI to Protocol 1 of the ACP agreement). However, diagonal cumulation under GSP is constrained by the requirement that the value-added in the final stage of production exceeds the highest customs value of any of the inputs used from countries in the regional grouping (art 72a).	The Everything but Arms (EBA) Agreement has been incorporated as amendment to the EU- GSP system as Regulation EC 416/2001 and was signed on 28 February 2001 and can be found at http://trade.ec.europa.eu/doclib/docs/2004/october/tradoc_111459.pdf ROO under the EU- GSP schemes are defined by Articles 66 to 97 and Annexes 14 to 18 and 21 of Regulation (EEC) No. 2454/93[26], as amended by Regulations Nos. 12/97, 1602/2000 and 881/2003 . The ACP partnership Agreement was signed in Cotonou on 23 june 2000 and the text can be found at http://eur-lex.europa.eu/LexUriServ/site/en/oj/2000/l_317/l_31720001215en00030286.pdf RoO under the ACP agreement are detailed in Protocol 1 of the ACP Agreement: "Concerning the definition of the concept of origination products and methods of administrative cooperation", as well as its annexes.

Source: Portugal-Perez (2007)

[25] Bilateral GSP cumulation applies between the EC and the beneficiary country, diagonal cumulation applies between the EC, Norway and Switzerland and the beneficiary country and regional cumulation applies between the beneficiary country belonging to one of the three GSP regional cumulation groups (Group I (Brunei-Darussalam, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, Vietnam), Group II (Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Peru, Venezuela), and Group III (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka)). These types of cumulation may be combined for a single operation. Source: http://ec.europa.eu/taxation_customs/customs/customs_duties/rules_origin/preferential/article_779_en.htm

[26] http://europa.eu.int/eur-lex/en/consleg/pdf/1993/en_1993R2454_do_001.pdf

Appendix D. The Eaton-Tamura (ET) tobit model.

This appendix spells out the ET model estimated in the main text and derives expressions for the marginal effects drawing a distinction between continuous variables (lumped in vector x_{it}^{jk}) and dummy variables (lumped in vector R_{it}^{jk})

D1.The Eaton-Tamura (ET) tobit model

Consider the following 'Tobit-like' :model:

$$\ln\left(a_v + M_{it}^{jk}\right) = \begin{cases} y_{it}^{jk*} = \beta_0 + \beta_1 x_{it}^{jk} + \beta_2 R_{it}^{jk} + \varepsilon_{it}^{jk} \;\equiv\; \mathrm{Z}_{it}^{jk}\theta_M + \varepsilon_{it}^{jk}, \text{ if } y_{it}^{jk*} \geq \ln\left(a_v\right) \\ \ln\left(a_v\right) \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \text{if } y_{it}^{jk*} < \ln\left(a_v\right) \end{cases} \quad (1.8)$$

where M_{it}^{jk} is country k's imports of apparel variety j from country j at year t, x_{it}^{jk} is a continuous regressor, R_{it}^{jk} is a dummy variable, and a_v is endogenously determined in the maximum-likelihood procedure. Notice that $M_{it}^{jk} \geq 0$, and that $\varepsilon_{it}^{jk} \sim Normal\left(0,\sigma^2\right)$.

Notice also that for simplicity, we defined: $\beta_0 + \beta_1 x_{it}^{jk} + \beta_2 R_{it}^{jk} \left(\equiv \mathrm{Z}_{it}^{jk}\theta_M\right)$, and $\ln\left(a_v + M_{it}^{jk}\right)\left(\equiv \mathrm{y}_{it}^{jk}\right)$

Model (1.8) is equivalent to the constant elasticity model:

$$M_{it}^{jk} = \begin{cases} M_{it}^{jk*} = -a_v + \exp\left(\beta_0 + \beta_1 x_{it}^{jk} + \beta_2 R_{it}^{jk}\right)\exp\left(\varepsilon_{it}^{jk}\right) \;\; \text{if } M_{it}^{jk*} \geq 0 \\ 0 \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad \text{if } M_{it}^{jk*} < 0 \end{cases} \quad (1.9)$$

As $\varepsilon_{it}^{jk} \sim Normal\left(0,\sigma^2\right)$, then $\exp\left(\varepsilon_{it}^{jk}\right)$ is a log-normal random variable.

From model (1.8), the maximum likelihood estimates of a_v and $\theta_M \left(=(\beta_0,\beta_1,\beta_2)\right)$ maximize the log-likelihood function:

$$\ln L\left(a_v,\theta_M\right) = \sum_{M=0}\ln\left(F_{it}\right)$$
$$+\sum_{M>0}\left\{-\ln\left(a_v + M_{it}^{jk}\right) - 0.5\left(\ln\left(2\pi\right) + \ln\left(\ln\left(2\pi\right)\right)\right) - \left(1/2\sigma^2\right)\left[\ln\left(a_v + M_{it}^{jk}\right) - \mathrm{Z}_{it}^{jk}\theta_M\right]^2\right\}$$

where F_{it} =Prob$\left(M_{it}^{jk} = 0\right) = \text{Prob}\left(\varepsilon_{it}^{jk} \geq \ln\left(a_v\right)\text{-}\mathrm{Z}_{it}^{jk}\theta_M\right)$[27], as determined from (1.8)

[27] We correct for the typographical errors in the log-likelihood function Eaton and Tamura (1994), page 491.

D2. Evaluating the marginal effects in a ET tobit model

We are interested in calculating the two marginal effects:

1) $\dfrac{\partial E\left[M_{it}^{jk} \middle| M_{it}^{jk*} > 0\right]}{\partial x_{it}^{jk}}$ for the continuous variable x_{it}^{jk}

2) $\dfrac{\Delta E\left[M_{it}^{jk} \middle| M_{it}^{jk*} > 0\right]}{\Delta \partial R_{it}^{jk}}$ for the dummy variable R_{it}^{jk}

1) $\dfrac{\partial E\left[M_{it}^{jk} \middle| M_{it}^{jk*} > 0\right]}{\partial x_{it}^{jk}}$

We deduce from model (1.9):

$$E\left[M_{it}^{jk} \middle| M_{it}^{jk*} > 0\right] = -a_v + \exp(\beta_0 + \beta_1 x_{it}^{jk} + \beta_2 R_{it}^{jk}) E\left[\exp\left(\varepsilon_{it}^{jk}\right) \middle| M_{it}^{jk} > 0\right] \quad (1.10)$$

Deriving (1.10), with respect to x_{it}^{jk}:

$$\begin{aligned}\frac{\partial E\left[M_{it}^{jk} \middle| M_{it}^{jk*} > 0\right]}{\partial x_{it}^{jk}} &= \beta_1 \left(\exp\left(\beta_0 + \beta_1 x_{it}^{jk} + \beta_2 R_{it}^{jk}\right) E\left[\exp\left(\varepsilon_{it}^{jk}\right) \middle| M_{it}^{jk} > 0\right]\right) \\ &= \beta_1 \left(-a_V + \exp\left(\beta_0 + \beta_1 x_{it}^{jk} + \beta_2 R_{it}^{jk}\right) E\left[\exp\left(\varepsilon_{it}^{jk}\right) \middle| M_{it}^{jk} > 0\right] + a_V\right) \\ &= \beta_1 \left(a_V + E\left[M_{it}^{jk} \middle| M_{it}^{jk} > 0\right]\right)\end{aligned} \quad (1.11)$$

Furthermore, if x_{ij} is a variable expressed in percent terms (such as a tariff) or a logarithmic variable (such as log(GDP) , we will be interested in estimating the semi–elasticity:

$$\begin{aligned}\frac{\partial E\left[M_{it}^{jk} \middle| M_{it}^{jk} > 0\right]}{\partial x_{it}^{jk}} \frac{1}{E\left[M_{it}^{jk} \middle| M_{it}^{jk} > 0\right]} &= \beta_1 \left(a_V + E\left[M_{it}^{jk} \middle| M_{it}^{jk} > 0\right]\right) \frac{1}{E\left[M_{it}^{jk} \middle| M_{it}^{jk} > 0\right]} \\ &= \beta_1 \left(1 + \frac{a_v}{E\left[M_{it}^{jk} \middle| M_{it}^{jk} > 0\right]}\right)\end{aligned} \quad (1.12)$$

This semi elasticity can be interpreted as the percent change in imports following a 1% increase in the value of the continuous variable x_{ij}

2) Using the definition of model (1.9), we develop:

$$\begin{aligned}\frac{\Delta E\left[M_{it}^{jk}\middle|M_{it}^{jk*}>0\right]}{\Delta\partial R_{it}^{jk}} &= E\left[M_{it}^{jk}\middle|M_{it}^{jk*}>0,R=1\right]-E\left[M_{it}^{jk}\middle|M_{it}^{jk*}>0,R=0\right]\\ &= -a_V+\exp\left(\beta_0+\beta_1 x_{it}^{jk}+\beta_2\right)E\left[\exp\left(\varepsilon_{it}^{jk}\right)\middle|M_{it}^{jk}>0\right]\\ &\quad +a_V-\exp\left(\beta_0+\beta_1 x_{it}^{jk}\right)E\left[\exp\left(\varepsilon_{it}^{jk}\right)\middle|M_{it}^{jk}>0\right]\\ &= \left[\exp\left(\beta_2\right)-1\right]\exp\left(\beta_0+\beta_1 x_{it}^{jk}\right)E\left[\exp\left(\varepsilon_{it}^{jk}\right)\middle|M_{it}^{jk}>0\right]\\ &= \left[\exp\left(\beta_2\right)-1\right]\times E\left[M_{it}^{jk}\middle|M_{it}^{jk*}>0,R=0\right]\end{aligned} \tag{1.13}$$

We are interested in evaluating the percent change of the expected value of positive values of the dependent variable (here imports) following a unit-change in the dummy R_{it}^{jk} (in our case shifting from a double to a single transformation RoO for apparel).

The expression is equal to:

$$\frac{\Delta E\left[M_{it}^{jk}\middle|M_{it}^{jk*}>0\right]}{\Delta\partial R_{it}^{jk}}\frac{1}{E\left[M_{it}^{jk}\middle|M_{it}^{jk*}>0,R=0\right]}=\left[\exp\left(\beta_2\right)-1\right] \tag{1.14}$$