Preferential Market Access Design: Evidence and Lessons from African Apparel Exports to the US and to the EU

Jaime de Melo
Alberto Portugal-Perez

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Jaime de Melo*
Université de Genève, and FERDI
and
Alberto Portugal-Perez*
World Bank

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ABSTRACT
With a quasi-identical preferential margin of 10%, the EU and the US offer apparently similar preferential market access for apparel exports to a group of African countries. Yet, effective market access under the two schemes has been very different due to implementation design because these agreements differ in their product-specific rules of origin (PSRO). While access to the EU market requires yarn to be woven into fabric and then made-up into apparel in the same country or in a country qualifying to satisfy origin requirements (double transformation), starting around 2001, the US Africa Growth Opportunity Act (AGOA) grants a “Special Regime” (AGOA-SR) to “lesser developed countries” allowing them the use of fabric from any origin and still meet the criteria for preferences (single transformation). We exploit this ‘quasi-experimental’ change in the design of preferences. Using several estimation methods, we estimate that the AGOA-SR contributed to an increase in export volume of about 42% for the top seven beneficiaries or approximately three times as much as the growth effect of the 10% preferential margin granted under AGOA. Design also mattered for diversity in apparel exports as the number of export varieties grew more rapidly under the AGOA-SR regime.

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*E-mail: jaime.demelo@unige.ch
E-mail: aportugalperez@worldbank.org

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1. Introduction

The World Trading System is built around the pillars of non-discrimination, transparency and reciprocity, but it also includes preferential market access for developing countries among them. It is increasingly accepted that progress in multilateral negotiations to reduce trade barriers requires ‘serious’ implementation of preferential market access and the word ‘Development’ has been added (some would say tacked on) to the Agenda for the Doha Round, with the new ‘Aid for Trade’ literature exploring this agenda (see e.g. Hoekman (2006) and the papers in the symposium issue). Focusing on a case study of apparel exports by Sub-Saharan African Less Developed Countries, this paper gives evidence that improved design in preferential schemes can enhance developing-country market access to industrialized countries’ markets can have a catalytic effect: “trade aid” through market forces can be powerful stimulant for beneficiaries of easy-to-access preferences.

Meeting Rules of Origin (RoO) requirements are the core implementation tool in all preferential schemes. A growing literature concludes that these requirements--necessary to prevent trade deflection--really serve as protectionist devices that end up impeding market access for the intended beneficiaries. This evidence is based on two key ingredients: utilization rates of preferences now becoming available at the 6-digit level in the Harmonized System (HS) classification (product-specific rules of origin (PSRO) are usually defined at the HS-6-digit level) and from 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

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1 Most recently, in June 2011, as the Doha negotiations are once more in an impasse, Pascal Lamy proposes a less ambitious “plan B” in which negotiators would agree by December 2011 that the 49 Less Developed Countries would get improved market access by duty-free-quota free access to the OECD markets along with simplified rules of origin (RoO).
2 Any preferential trading scheme falling short of a full-fledged Customs Union, such as ‘reciprocal’ Free-Trade-Areas (FTAs) or ‘non-reciprocal’ preferential schemes granted by industrial countries to developing countries like the Generalized System of Preferences (GSP), require Rules of Origin (RoO) to prevent trade deflection. Estevadeordal and Suominen (2006) give a thorough description of RoO around the world.
PSRO are “made-to-measure” protectionist devices. With an overwhelming share of North-South trade taking place under preferential status, getting a better grasp of the effects of RoO becomes now a first-order objective in improving our understanding of the overall restrictiveness of trade policy.\(^3\)

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)) and variable costs, the data also often shows high utilization of preferences for tariff lines with zero Most Favorited Nation (MFN) tariffs\(^4\), casting doubt on the validity of utilization rates as a proxy indicator of the costs associated with meeting RoO requirements. Indeed, 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, Africa Growth Opportunity Act (AGOA) for the US and Everything but Arms (EBA) or Cotonou preferences for the EU. Yet, as shown here, export growth of textiles and apparel 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 ignoring that export growth rates to the two destinations have diverged around the time when RoO to one market, the US, were relaxed.

This paper exploits 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. While obtaining EBA (or Cotonou) preferences require qualifying yarn (i.e. coming from the exporter or the EU) being woven into fabric and then made up into apparel in the same African exporter (the so-called ‘double transformation’ rule),

\(^3\) Krueger (1997, 1999) are the seminal contributions. Estevadeordal’s (2000) study of Mexican exports under NAFTA is the first that evaluates the overall restrictiveness of PSRO (the EU has over 500 different PSRO). Krishna (2006) surveys the theoretical literature, and Cadot and de Melo (2008) review the empirical literature.

\(^4\) See for instance. François, Hoekman and Manchin (2006) and the comparison of utilization rates as according to preferential margins across EU and US preferential schemes (Cadot and de Melo (2008, table 2)).
AGOA grants a “Special Regime” to selected (22) African exporting countries allowing them to use fabric of any origin and still meet the origin requirement to qualify for preferential access.

The analysis is based on product-level exports at the HS6-digit level for knitted apparel (Chapter-61) and non-knitted apparel (Chapter-62) over the period 1996-2004 which spans the period when the US changed its PSRO to the “Special Regime” (SR). We estimate that, after controlling for other factors, relaxing the PSRO by allowing the use of fabric from any origin under the SR increased significantly apparel exports to the US by about 42% for the top seven African exporters in the group compared to the alternative of preferential market access with a business-as-usual implementation scheme under a double transformation requirement (we attribute the lack of supply response in the other countries receiving the AGOA-SR to institutional weakness). In addition to this increase in exports, we also observe a higher rate of increase of new products exported to the US than to the EU during the period.

These results suggest strong expansion in response to a reduction in fixed costs associated with meeting origin requirements, results that can be usefully compared to those in Cherkashin et al. (2010) who also study the effects of granting preferences with and without RoO for exports of woven apparel from Bangladesh in a structural partial-equilibrium heterogeneous-firm model à la Melitz (2003). Their study is for a cross-section of 200 Bangladeshi firms (data collected over the period 1999-2004) exporting woven textiles to the EU and US markets under much the same assumptions as ours: all production is for exports, and exports are destined to one or both the EU and US markets, under the small-country assumption. Their calibrated estimates suggest substantial fixed costs. They estimate that a $1 reduction in fixed costs would generate an increase in exports in the range 10$-$40$ and conclude that easy-to-obtain preferences and/or reduction in fixed costs can have a catalytic effect and, notably, that preferences need not divert trade from other markets as predicted in a setting with no fixed costs. Though the methodology is different and they do not study the costs of RoO in a dynamic context panel like us, the magnitude of their estimates are in line with ours.

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 the introduction of the “special rule” (SR) under AGOA. Section 3 provides descriptive estimates and summarizes the results from an
'event-analysis' of aggregate exports of textiles and apparel from AGOA beneficiaries to the EU and US markets. Section 4 discusses alternative approaches to estimating an appropriate model and the selected econometric strategy. Section 5 presents the main results disentangling the effects of the SR from those following from the reduction in protection in the US market. Section 6 then uses a count-model to study the evolution of new apparel exports during the period. Section 7 concludes.

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

Apparel under the Generalized System of Preferences (GSP) and EBA. Since 1971, the Generalized System of Preferences (GSP) provides non-reciprocal preferential access to the EU market. For textiles and apparel, PSRO required that apparel should be manufactured from qualifying yarn and sometimes wholly produced in the exporter country. Production from yarn entails that a double transformation process (yarn→textile→apparel) must take place in the beneficiary country with the yarn being woven into fabric and then the fabric cut and made-up into clothing. Under the “Single List” in operation since 2000, the EU GSP system also accepted bilateral cumulation between the EU and a beneficiary country. Regional cumulation could also take place but only within three regional groupings: the Association of Southeast Asian Nations (ASEAN), Central American Common Market, and the Andean Community, but not amongst African countries. Similar rules applied for preferential access under the Cotonou agreement available for former colonies (the so-called Asia- Caribbean-Pacific (ACP) group of countries) so in table 1 we lump together EU imports under both schemes (see de Melo and Portugal-Perez (2008) for details).

Apparel under AGOA. Operational since the second semester of 2000, AGOA provides tariff-free access for a group of 22 countries from Sub-Saharan African, a non-negligible market access since many goods are excluded from the US Generalized System of Preferences (GSP)

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5 The discussion paper version provides further description.
6 Cumulation provisions allow contracting parties the use of intermediate goods from each other without losing origin status.
(e.g. watches, footwear, handbags, luggage, work gloves, and apparel). Thus, unlike beneficiaries of US GSP preferences, AGOA beneficiaries do not pay the US MFN tariff of 11.5%. Initially, rules of origin for apparel under AGOA applied the triple transformation process used for NAFTA and other US preferential schemes so that apparel had to be assembled in one or more AGOA eligible country from US fabrics (or a African-country fabrics up to a specified percentage), which in turn were made from US yarn. However, the “Special Rule” (henceforth referred to as the ‘SR’) for Lesser Developed Countries established since 2001 (see table 1 below for the date of entry into force) relaxed the triple transformation rule (cotton→yarn→textile→apparel) by conferring duty-free access to apparel regardless of the origin of fabric (cotton, yarn, textile) used to produce it. In effect, meeting origin requirement under the AGOA-SR implied applying a single-transformation requirement (fabric →apparel).

3 Trends and Event-Analysis Estimates

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 the simple transformation rule under the AGOA-SR. The data are aggregated over a potential of 111knitted (Chapter-61) and 118 non-knitted (Chapter-62) apparel products defined at the HS-6digit level. Trends for knitted and non-knitted apparel were similar for both countries with US imports of knitted apparel (less sensitive to the double transformation rule) growing more rapidly. Figure 1(b) indicates that the MFN tariffs are very similar for both countries throughout the period, and so are the preferential margins once AGOA became operative. However, the large change in preferential margin for the US coincided quite closely (but not entirely) with the entry into force of the SR.

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. 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 in the discussion paper version) indicating that not all countries benefited equally from the SR.

Among countries qualifying for the AGOA SR, seven 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 three columns of table 1 report the year when the SR came into effect for each country, as well as the rate of apparel exports growth to the US for the period preceding and following the entry into force of the SR. Note that the seven 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. Except for Madagascar, the growth rate of exports to the US has increased for all these major exporters.

Table 1 also reports two columns with the utilization rate of preferences across products 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,

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In both the US and the EU, apparel imports from AGOA countries as a share of all apparel imports were small, constituting less than 0.1 percent throughout the studied period. Indeed, AGOA apparel imported by the EU as a share of all its apparel imports went down by half from 0.012 percent in 2000 to 0.006 percent in 2004. However, AGOA apparel as a share of all apparel imported by the US more than tripled from 0.027 percent in 2000 to 0.090 percent in 2004. This outcome is contrary to the prediction by Cherkasin et al (2010) whose model predicts that with firms operating under fixed costs, preferences need not result in trade diversion from other markets.
in spite of these high utilization rates under both schemes, export volumes evolved quite differently.

As a first step, we carried out an « event-analysis» to control for the fact that the SR was not granted to all beneficiaries on the same year. To do so, we reorganized the data by converting calendar-years into event-years and checked for the statistical significance of volume changes around the time when the SR was introduced. As expected, the coefficients detecting changes in export growth after the introduction of the SR were highly significant confirming that something happened to aggregate apparel exports to the US around the time when the SR was adopted. The estimates reported in the discussion paper version showed a total increase of about 300% in apparel exports for the bloc of 22 countries with a yearly growth of apparel exports of over 20% a year. Results from the event analysis were robust to several specification and sample size checks. The problem with the event-analysis estimates is that they do not control for the increases due to the introduction of the preferences, to those due to the introduction of the single transformation “Special Rule” (SR).

4 Empirical Framework

As detailed in the survey in Cadot and de Melo (2008), estimating the effects of RoO on export flows and welfare is difficult because of the complexity of these rules (over 500 different product-specific rules of origin for access to the EU market). Until recently approaches relied on estimates coming from studies of utilization rates or of price comparisons from sales to preferential versus non-preferential destinations. For example, Carrère and de Melo (2006) show that having controlled for variations in preferential access, utilization rates were higher when indices of RoO are less restrictive. Using a switching regression approach, Francois et al (2006) find that firms start using preferences when preferential margins exceed 4 percentage points. Using Mexican export data on exports of apparel at the HS-8 level, Cadot et al. (2005) find that the pass-through of the preferences is only 80% and that this pass-through falls to 50% when increased costs for intermediates purchased from the US under the RoO requirement is factored in.
The upshot is that it is difficult to estimate the cost-raising effects of RoO, notably because these rules remain unchanged. In the case of AGOA where there was a change, one has to disentangle the SR effect from the change in preferential status under AGOA. Data permitting, a satisfactory approach might be to follow in the footsteps of Cherkashin et al. (2010) who develop a fully structural model in which heterogeneous firms with different productivities are subject to demand and to firm-specific shocks. The firms then decide whether or not to enter the textile market, then which destination to export to (i.e. EU or US or both) and finally under which trade regime (preferential with fixed costs associated with proving origin or MFN with no fixed costs). However, obtaining a solution to their structural model requires a number of strong identifying restrictions, notably on costs associated with meeting origin requirements. 8

In any event, some of their maintained assumptions such as a flat 15% compliance cost for all firms to comply with origin associated deserve confrontation with the data.9 Their reliance on cross-section data only for estimation makes it more easily applicable, but their results should at least be compared with those from a dynamic panel. Finally, to fit a structural model to the exports of apparel by SSA to the EU and US markets would require firm-level data (which was collected by the authors of the Bangladesh study) that are not available for any of the AGOA beneficiaries.

The alternative to a structural model is to ‘let the data speak’ and exploit the variation in the data occasioned by the SR and to adopt a less ambitious framework that leads to a reduced form that subsumes the market entry decision. In the discussion paper version, we sketch such a model where a representative apparel producer, sells all its production either to the US or the EU market (these are the two main export destinations for AGOA beneficiaries). The firm sells differentiated products (or since we do not have firm data, heterogeneous firms sell a homogenous product to both markets with fixed entry costs to each market). The firm uses textiles as an input and faces a downward sloping demand curve in the two destination markets. Under the single transformation rule, the firm chooses its textiles from the low-cost

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8 Identification assumes that costs associated with meeting origin requirements raise unit production costs by 15%, that obtaining a quota license to sell to the US under the MFA costs 7%, that decisions about entry into each market are made separately, that expenditures on Bangladeshi goods come entirely at the expense of expenditures from other exporters.

9 Cadot and de Melo (2008) show that utilization rates of preferences do not increase much when preference margins increase from 4% to 12%. While this could be attributed for a survey of evidence as to why this is unlikely to be the case. That shortcut would be defensible if a uniform value-content rule were adopted for all textile products. But this is not the case, even within the textile and clothing sector.
suppliers while under the double or triple transformation rules, it is forced to purchase textiles from the high-cost partner. The comparative statics of the model show that export sales to a market respond positively to: (i) a fall in tariffs (i.e. to an increase in preferential access under AGOA to the US), (ii) an increase in income in the destination market and (iii) a relaxation of the rule of origin.

The model sketched above is estimated over the 1996-2004 period for 229 varieties of apparel (HS-6-digit level) for 22 AGOA-SR beneficiaries. Because the data is very disaggregated, we discuss estimation strategies to deal with 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 sketched 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 capturing demand shifters in the EU and the US, and on changes in PRSO. Assuming a log linear relationship, we estimate:

$$
\ln(a_i + X_{i,t}^{j,k}) = \beta_0 + \beta_1 R_{i,t}^{j,k} + \beta_2 VC_{i,t}^{j,k} + \beta_3 \left(k_{i,t}^{mfn}\right) + \beta_4 \left(f_{i,t}^{j,k,\text{pref}}\right)
$$

$$
+ \beta_5 \ln\left(Y_t^i\right) + \beta_6 D_{i}^{\text{Madag.-02}} + \sum_{j \in J} \sum_{k \in K} \delta_{j,k} \left(D_i^{j} \times D_k^{k}\right) + \varepsilon_{i,t}^{j,k}
$$

(1)

where:

- $X_{i,t}^{j,k}$ are exports of apparel variety $i$ from African country $j$ to market $k$ (EU or US) in year $t$.
- $a_i$ is a parameter to be determined (see below).
- $R_{j,t}^{i,k}$ 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 ($k = US$) in year $t (\geq 2000)$, and zero otherwise. $R_{j,t}^{i,k}$ 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 SR from August 2001, then the dummy is set equal to one for $t = 2001$ and for successive years.

- $VC_{j,t}^{i,k}$ is a dummy variable taking the value one if non-knitted apparel (CH-62 in the Harmonized System nomenclature of trade) of variety $i$ is subject to an alternative (or optional) less restrictive regional value-content (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 ($k = EU$), and zero otherwise.

- $t_{j,t}^{k, Mn}$ is the MFN tariff applied on apparel product $i$ by importer $k$ in year $t$.

- $t_{j,t}^{i,k, pref}$ is the preferential tariff applied on apparel product $i$ imported from $j$ that benefits from country $k$’s preferential regime when complying with the PSRO. 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 2000 for the US).

- $Y_t^k$ is GDP of country $k$ in year $t$.

- $D_{j}^{i} \left[ D_{i}^{k} \right]$ 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)

- $D_{j}^{Madag-02}$ is a dummy taking the value of 1 for Madagascar’s export loss in 2002 provoked by its political crisis.

- $\epsilon_{j,t}^{i,k}$ is the error term.
According to (1), expected coefficient signs are: $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 < 0, \beta_5 > 0, \beta_6 < 0$, and we expect the coefficient of the value-content (VC) dummy to be positive but smaller than the one for the SR-dummy ($\beta_2 < \beta_1$).

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, which were previously bounded by quotas. Export data and tariff data were compiled from IDB-WTO and TRAINS/WITS at the HS6-digit. 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 HS6-digit level of aggregation exported to the two destinations. The full characteristics of the sample and descriptive statistics are available in the discussion paper version, which also reports results for the full sample of 22 countries. However, because 95% of apparel exports are accounted for by the 7 major exporters, we restrict ourselves to reporting results of estimates on this reduced sample where data quality is arguably superior not only because there are positive aggregate exports by each country every year, but also because these countries export a larger number of products.

4.2. Econometric strategy

As explained in the discussion paper version, lack of plausible instruments at this level of disaggregation precluded us from implementing a two-stage procedure in which a decision to export a specific apparel product to a given destination is taken in a first step, then in a second step a decision is taken on volume. Instead, we concentrated on how to deal with zero values at the product line by experimenting with several estimators, in all cases but one using a
logarithmic transformation of the dependent variable 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)) consists of shifting all export values by one dollar (i.e. fixing $a_v=1$ in(1)) 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 due to corner solution outcomes. However, as shown below, 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. For this reason, we also used the Eaton and Tamura (1994) maximum likelihood estimator that endogenizes the choice of the \( a_v \) parameter (we refer to it as the ET-Tobit results). 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 \( \ln \left( a_v \right) \) (see Appendix D of the discussion paper version for further discussion).

But estimates from Tobit models rely on the assumptions of normality and homoskedasticity of errors. Normality and homoskedasticity of errors are rejected by statistical tests in our data and model. As an alternative, we implement the trimmed least absolute deviations (LAD) estimator for limited dependent variable models with fixed effects proposed by Honoré (1992) maintaining \( \ln \left( a_v + X_{i,t}^{j,k} \right) \) as the dependent variable. This estimator has the advantage of being consistent and asymptotically normal; therefore, it is neither necessary to assume a parametric form for the errors –such as normality– nor to assume homoskedasticity.

We also report results from the Poisson Pseudo Maximum Likelihood (PPML) estimator proposed by Santos Silva and Tenreyro(SS-T) (2006). The PPML estimator deals with
heteroskedasticity in constant-elasticity models. Using Monte-Carlo simulations, SS-T show that the PPML estimator produces estimates with the lowest bias for different patterns of heteroskedasticity for a data generating process relying on cross-section. Yet, the PPML has not been tested in a panel data context, and also has shortcomings. Martin and Pham (2008) have 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.

As discussed below, compared to other methods, PPML produces an estimate of the SR coefficient that is closest to the one estimated by the trimmed LAD method, but some other coefficient estimates do not have expected signs and/or a reasonable magnitude. In their simulations, SS-T (2006 and 2011) do not assess the performance of the PPML either in a panel context or in the presence of omitted variable bias and/or measurement error. Thus, the trimmed LAD estimator may indeed outperform the PPML in a panel data context. In addition, the Trimmed LAD estimator for Tobit models is not considered as a contender to the PPML estimator in the simulations reported by SS-T. This leaves us in a difficult position to choose the best estimator. However, given the large number of zeroes in the data and the rejection of the usual assumptions about the errors, it would appear that, on a priori grounds the LAD estimator is the preferred estimator. It also turns out to give the most plausible coefficient estimates.

5. Results

5.1 Main Results

Tables 2 and 3 report the results for the sample of 7 countries with the alternative estimators. We then report on results of robustness checks on sample size and unobserved year-specific effects that are available in the discussion paper version. Table 2 presents the results from estimating (1) with the last row reporting the estimated elasticity of exports to the introduction of the SR (as captured by the $R_{i,t}^{j*}$ 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 (appendix D gives the details on the ET-Tobit and the computation of marginal effects). Column 1 reports the truncated OLS method. The estimate of $\beta_1$ 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 2 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 zero-export observations. The estimated $\beta_1$ is slightly reduced but still positive and significant. Although the sign of ln(GDP) and VC coefficients switch to their expected signs, including zero observations in an OLS model leads to biased estimates.

Columns 3 and 4 report Tobit estimates. 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” (with $a_v=1$) Tobit estimates in column 3 account more appropriately for corner solution outcomes of the dependent variable. 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 $\beta_1$, are very sensitive to the choice of $a_v$ used to avoid truncation.\footnote{Coefficient estimates for $\beta_1$ next to corresponding values of $a_v$ are: ($a_v=1$, $\beta_1=4.51$ ); ($a_v=0.1$, $\beta_1=5.34$); ($a_v=0.01$, $\beta_1=6.18$ );($a_v=10$, $\beta_1=3.68$ ) confirming that the estimates under this approach depend on the relation of $a_v$ to the sample mean.}

\footnote{We estimate pooled Tobit models. Their underlying assumption considers the structure of the error-term to be uniform across exporters and years. This assumption is defensible as African exporters in our sample have arguably a similar structure. Moreover, as discussed by Woodridge (2002), the Tobit is flexible and it can accommodate many categories of independent variables, such as time dummies, interactions of time dummies with time-constant or time-varying variables, or lagged dependent variables.}
Indeed, differences between ‘observations’ of the dependent variables, \( \ln(a_v + X^{j,k}_{i,t}) \), becomes smaller as \( a_v \) increases.

Column 4 reports the ET-Tobit results that include an estimate of the value of \( a_v \) that fits best the data. All coefficient signs are as expected and the parameter values are more plausible even if the income elasticity estimate is still high (3.7). 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 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 (CH-62) is associated with an increase of more than 125% (=exp(0.81)-1) in expected positive exports for these lines. As expected, 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 percentage point 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 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 2000, shown in figure 1b, is estimated to have increased African exports by about 96 percent or about a third of the growth attributable to a single-transformation rule.

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 is about 55 % as captured by
the marginal effect of $D_{Madagascar-02}$ at the bottom of column 4 in table 2 (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) could be promising as coefficient values have the right signs and are significant. At the same time, the high values for 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 could produce an upward-bias in the estimates.

Recall that Tobit models (columns 3 and 4) rely on the assumptions of normality and homoskedasticity of errors. Unfortunately, tests reject normality and homoskedasticity of errors in both models\textsuperscript{12}. Estimates from the preferred LAD model that does not require normality of errors not homoskedasticity are reported in column 5 in table 2. The results suggest a lower effect of the SR approximately equivalent to a 42\% increase in exports. At the same time, all other coefficients have the expected signs and have more plausible magnitudes. Indeed, the presence of the alternative VC requirement for some non-knitted apparel is associated with an increase of 4\%, whereas the income elasticity of the demand for African apparel imports goes down to 0.48. The 12 percent cut in tariffs applied to Africa apparel following AGOA is estimated to have increased African exports by about 14 percent, or a third of the export growth attributable to the special rule, as also estimated by the ET-tobit method.

Finally, column 6 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 constant-elasticity models, such as gravity models. The estimated effect of the SR captured by the RoO dummy is still significant but now drops down to an increase of 84\%, which, among estimates in table 2, is the closest to the Trimmed LAD estimates.

\textsuperscript{12} We use standard Lagrange multiplier (LM) tests of homoskedasticity and normality of errors for Tobit models. See Cameron and Trivedi (2009) for more details on how to implement the tests in Stata. The P-values of the LM tests for both, Tobit (column 3, table 2) and ET-tobit (column 4, table 2), are small; thus, the tests fail to accept the homoskedasticity and the normality of errors:

\begin{center}
\begin{tabular}{l|c|c}
\hline
LM tests & Tobit & ET-Tobit \\
\hline
Ho: Homoskedasticity & 0.002 & 0.002 \\
Ho: Normality of errors & 0.001 & 0.001 \\
\hline
\end{tabular}
\end{center}
estimate. There is also a sign reversal for the VC, $t_{i,j}^{k,\text{pref}}$, and $t_{i,j}^{j,k,\text{MEN}}$ coefficients, the latter no longer statistically significant. In sum, the Trimmed LAD estimator seems to outperform the PPML in a panel data context, in the presence of omitted variable bias, and/or measurement error.  

5.2. Robustness Checks and Extensions

Table 3 turns to Trimmed LAD estimates of the cumulative effects of the AGOA-SR on exports by including three additional dummy variables ($R_{i,j}^{j,k}$, $R_{i,j}^{k}$, and $R_{i,j}^{j,k}$) to (1). These dummy variables -- defined in the same way as those in (1) 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 $R_{i,j}^{j,k}$ is equal to one if country $j$ is at least in the second year after being entitled to the SR program (which includes the third and the fourth year), and zero if not. The same applies for $R_{i,j}^{j,k}$ and $R_{i,j}^{j,k}$. Then, the coefficient of $R_{i,j}^{j,k}$ 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 3 here: Robustness checks

Column 1b reports the approximate growth rates of exports computed from estimates of the dummy-coefficients in column 1a. The biggest change in exports 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 62% in the three year period, close to 35% occurred in the first year.

At the end of their answer to “The Log of Gravity revisited”, Santos-Silva and Tenreyro (2010) affirm that: “the PPML estimator can certainly be outperformed in some situations, and we very much welcome the scrutiny of our results.” As simulations using data-generating processes in SS-T(2006 and 2011) fail to assess the performance of the PPML in a panel context, in the presence of omitted variable bias, and/or measurement error and do not consider the Trimmed LAD estimator for Tobit models, it may be worth pursuing scrutiny along these directions.
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 smallest coefficient for Botswana is not significant. The effect of the SR on exports from Kenya and Madagascar are found to be the largest (see figure A3 in appendix A of the working paper version).

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 in apparel plants and to diminish trading and other fixed costs which can be proxied by a country’s rank in the World Bank “Doing Business” indicator. As shown in figure 3 in the discussion paper version, on average countries best ranked along the DB indicator experienced higher growth in apparel exports during AGOA, and the correlation coefficient, ($\rho = -0.55$) is highly significant.

As explained previously, the SR dummy is set equal to one if a country benefits from the rule for at least 4 months. As Botswana and Malawi were eligible to the SR from August 2001, whereas Swaziland from July 2001, the effect may be reflected in the exports data only from 2002 onwards. In order to test the results to this choice of months when defining the SR dummy, we estimate the baseline model with an alternative SR-dummy, $RA_{j,k}^{i,t}$, that is equal to one only from 2002 onwards for Botswana, Malawi and Swaziland, and remains unchanged for other countries (columns 3a and 3b$^{14}$). Compared to the baseline estimates, the estimated impact of SR on exports decrease slightly to 39.5%.

RoO for textiles & apparel under AGOA was first characterized in 2000 by a triple transformation rule, which was subsequently transformed into the single-transformation requirement with the SR for Lesser Developed countries. An alternative way to characterize the triple transformation rule in 2000 is to include in the baseline estimates the following

$^{14}$ In other words: $RA_{j,k}^{i,t} = 1$, for $t > t^*$ where $t^* = 2001$ for Madagascar, Lesotho, and Kenya and $t^* = 2002$ for Swaziland, Namibia, Botswana and Malawi; $RA_{j,k}^{i,t} = 0$, otherwise.
dummy: $TT^{i,k}_{t,d} = 1$ for $t=2000$, and zero otherwise.\footnote{We are grateful to an anonymous referee for raising this point.} As seen in columns 4a and 4b, the coefficient of the special-rule dummy remains significant and positive, whereas the negative and significant coefficient of $TT^{i,k}_{t,d}$ confirms that the triple transformation requirement does not promote exports of countries benefiting from AGOA preferences to the U. S. market.

Finally, the results hold up to the following robustness checks reported in the discussion paper version. First, we replicated the estimations reported in table 3 for two samples: a sample of 16 countries with positive aggregate exports for each year, and the full sample of 22 countries. With few exceptions, the estimates are globally close to those in table 2. 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. We also controlled 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. Omitted variable bias and measurement error leading to our large estimated values could have resulted from not separating knitted (Chapter-61) and non-knitted apparel (Chapter-62) and from omitting an index of importer j’s real exchange rate. As the path of knitted and non-knitted apparel were very similar, 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 turned out also insignificant in spite the strong depreciation of the dollar to the Euro during the period.

6. 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 consider first a Poisson regression model (PRM) which allows us to
explore the correlates of \( \eta^{ij} \), the variable measuring the number of apparel varieties at the HS6-digit level exported by country \( i \) to country \( j \) at time \( t \). The set of regressors include the preferential tariff and the SR dummy. The right-skewness of the kernel densities of exported varieties reported in figure 2a is suggestive of a Poisson distribution. Figure 2b displays the estimated kernel densities of exported varieties when observations are broken down along export destination and along the date of entry into force of the AGOA-SR, with the exclusion of the outlier Madagascar (including Madagascar does not change the general pattern except for 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 for varieties exported to the EU. Although we are not able to attribute these results to firm entry into the market, these results are in accordance with those reported in Cherkashin et al. (2010) where a reduction in fixed costs leads to entry of firms into the market.

**Figure 2a and 2b here: Kernel density estimates**

By assumption, the Poisson regression model (PRM) requires the mean and variance of the count distribution to be identical, else there is overdispersion, which is the case here (see the results for the over-dispersion test in table 4). Then, PRM estimates are robust, but inefficient with downward-biased standard errors that can be corrected by the use of the negative binomial regression model (NBRM). Hence we report in table 4 the estimates from pooled, fixed effects (FE) and random effects (RE) with the NBRM. 16.

**Table 4: Count Estimates: Negative Binomial model**

With the exception of ln(GDP) which is insignificant, all coefficients have the expected sign and are significant. 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

---

16 The NBRM generalizes the Poisson model by re-parametrizing the parameter in the PRM as a random variable following a gamma distribution. Results from the PRM model which are more robust can be retrieved as a special case of the NBRM. Since they are very similar, to save space, we do not report them here.
exported by these African countries is small compared to the total universe of varieties that can be exported, these counterfactual estimates appear plausible.

7. Conclusions

If it is a truism that preferential market access requires preferences in the first place, actual market access depends on the design of the preference schemes. This paper has explored the effects of loosening a particularly costly product-specific rule of origin (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 single-transformation rule (called the “Special Regime” (SR) under AGOA for a group of African countries provides a ‘quasi-natural’ benchmark against which the effects of a change in this PSRO can be evaluated. This benchmark is particularly welcome because PSRO are extremely complex, vary across HS product lines within the same product category, and patterns of utilization preferences do not follow the expected pattern of utilization increase as preference margins go up. This is why a ‘quasi-natural’ experiment like the passage to the single-transformation Special Rule (SR) under AGOA presents a unique opportunity to study the costs of RoO requirements. The results in the paper confirm earlier (see Cadot and de Melo (2008) and more recent (See Cherkashin et al. 2010) work that RoO represent high fixed costs for firms

First, taking advantage of this quasi-natural experiment setting whereby African exports 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 Special Rule was associated with an increase in apparel exports from the seven main exporters by about 42%. This is about three times as much as the estimate of the effects of the tariff removal on Sub-Saharan African exports to the US estimated as a 14% 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 Special Rule and tariff reduction effects cannot be expected to have been estimated with precision because of 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 transformation”) requirements in textiles and apparel had little effects since utilization rates remained high for exports to both destinations. And for those who argue that there is not much preferential access for OECD countries to grant to Less Developed Countries because average tariffs barriers are already low, the results suggest a potential multiple effect of relaxing a commonly used PSRO in apparel with export growth for the receiving countries (by a factor of three in this case study).

Second, 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 study also points out to learning effects and a differential impact across countries. With respect to the dynamic effects of the AGOA-SR, there is 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 evidence that the supply response was conditioned by the business environment (at least as captured by the doing business indicator of the World Bank).17

To conclude, studies of the effects of preferential market access should focus as much on design as on preferences per se. Indeed, 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 textiles and apparel. However, at least in the case of apparel produced by the low-income African countries, the double-transformation requirement has discouraged developing exports at the intensive and the extensive margins. Development-friendly policies consistent with the spirit of granting preferential access to low-income countries would benefit from designing implementation schemes that would start by relaxing the stringency of RoO requirements.

17 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.
References


Martin, Will and Cong Pham (2008), Estimating the Gravity Model When Zero Trade Flows are Important”, mimeo, World Bank


Tables and figures to

Preferential Market Access Design: Evidence and Lessons from African Apparel 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: Authors’ calculations on data from WTO Integrated Data Base.
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.
Figures 2a and 2b
Kernel density estimates

Kernel density estimate
pooled data

kernel = epanechnikov, bandwidth = 4.03

Kernel density estimates: number of exporter lines in apparel
21 African exporters, exl. MDG: Prior-SR and Post-SR

kernel = epanechnikov, bandwidth = 3.0197
Table 1.
Apparel exports of countries benefiting from AGOA’s Special Rule (SR) in 2004

<table>
<thead>
<tr>
<th></th>
<th>Exports to the EU in 2004</th>
<th>Exports to the US in 2004</th>
<th>Date of entry into force of AGOA SR (year, month)</th>
<th>Exports growth to the US (yearly rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>share</td>
<td>Utilization Rate</td>
<td>share</td>
<td>Utilization Rate</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>Lesotho</td>
<td>0.50%</td>
<td>24.49%</td>
<td>32.92%</td>
</tr>
<tr>
<td>2</td>
<td>Madagascar</td>
<td>85.77%</td>
<td>96.83%</td>
<td>23.34%</td>
</tr>
<tr>
<td>3</td>
<td>Kenya</td>
<td>1.54%</td>
<td>92.53%</td>
<td>20.01%</td>
</tr>
<tr>
<td>4</td>
<td>Swaziland</td>
<td>0.53%</td>
<td>1.75%</td>
<td>12.90%</td>
</tr>
<tr>
<td>5</td>
<td>Namibia</td>
<td>0.05%</td>
<td>72.95%</td>
<td>5.68%</td>
</tr>
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<td>6</td>
<td>Botswana</td>
<td>6.01%</td>
<td>74.67%</td>
<td>1.46%</td>
</tr>
<tr>
<td>7</td>
<td>Malawi</td>
<td>0.06%</td>
<td>94.52%</td>
<td>1.93%</td>
</tr>
<tr>
<td>8</td>
<td>Ghana</td>
<td>0.07%</td>
<td>82.22%</td>
<td>0.53%</td>
</tr>
<tr>
<td>9</td>
<td>Uganda</td>
<td>0.00%</td>
<td>9.48%</td>
<td>0.29%</td>
</tr>
<tr>
<td>10</td>
<td>Ethiopia</td>
<td>0.34%</td>
<td>97.24%</td>
<td>0.24%</td>
</tr>
<tr>
<td>11</td>
<td>Cape Verde</td>
<td>2.43%</td>
<td>99.77%</td>
<td>0.22%</td>
</tr>
<tr>
<td>12</td>
<td>Tanzania</td>
<td>1.80%</td>
<td>99.53%</td>
<td>0.18%</td>
</tr>
<tr>
<td>13</td>
<td>Mozambique</td>
<td>0.08%</td>
<td>94.70%</td>
<td>0.16%</td>
</tr>
<tr>
<td>14</td>
<td>Sierra Leone</td>
<td>0.38%</td>
<td>4.04%</td>
<td>0.11%</td>
</tr>
<tr>
<td>15</td>
<td>Cameroon</td>
<td>0.17%</td>
<td>23.19%</td>
<td>0.02%</td>
</tr>
<tr>
<td>16</td>
<td>Nigeria</td>
<td>0.04%</td>
<td>1.67%</td>
<td>0.01%</td>
</tr>
<tr>
<td>17</td>
<td>Zambia</td>
<td>0.00%</td>
<td>100.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>18</td>
<td>Mali</td>
<td>0.03%</td>
<td>10.49%</td>
<td>0.00%</td>
</tr>
<tr>
<td>19</td>
<td>Senegal</td>
<td>0.17%</td>
<td>93.90%</td>
<td>0.00%</td>
</tr>
<tr>
<td>20</td>
<td>Niger</td>
<td>0.03%</td>
<td>82.09%</td>
<td>0.00%</td>
</tr>
<tr>
<td>21</td>
<td>Benin</td>
<td>0.01%</td>
<td>41.97%</td>
<td>0.00%</td>
</tr>
<tr>
<td>22</td>
<td>Rwanda</td>
<td>0.00%</td>
<td>30.23%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

TOTAL 100% 91.20% 100% 97.65% 01.apr 21.23% 34.32%

Source: Authors’ calculations from COMTRADE data. Countries ranked by decreasing order of combined total apparel exports to the US.

a) The value of total exports from these 22 countries to the EU/US is 209.6 [1385.1] Mio USD in 2004.
b) 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.

c) Exports growth are estimated from yearly export figures. Exports growth are not reported if a country has zero exports at the beginning of the period. If the country has benefited from eligibility to the SR before the end of August of a year, the country is assumed to have benefited from the rule the whole year.
Table 2: Elasticity of Exports to Changes in RoO

<table>
<thead>
<tr>
<th>Independent Variables (a)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{i,t}^{j,k}$ (&gt;0)</td>
<td>1.05</td>
<td>0.87</td>
<td>4.51</td>
<td>1.59</td>
<td>0.84</td>
<td>0.35</td>
</tr>
<tr>
<td>$VC_{i,t}^{j,k}$ (&gt;0)</td>
<td>-0.24</td>
<td>0.45</td>
<td>2.98</td>
<td>0.81</td>
<td>-0.36</td>
<td>0.04</td>
</tr>
<tr>
<td>$t_{i,t}^{j,k, pref}$ (&lt;0)</td>
<td>-0.01</td>
<td>-0.04</td>
<td>-0.26</td>
<td>-0.08</td>
<td>-0.01</td>
<td>-0.012</td>
</tr>
<tr>
<td>$\ln(\gamma_{t}^{j})$ (&gt;0)</td>
<td>-1</td>
<td>1.23</td>
<td>12.22</td>
<td>3.74</td>
<td>4.63</td>
<td>0.48</td>
</tr>
<tr>
<td>$D_{i}^{Madagascar}$ (&lt;0)</td>
<td>-0.23</td>
<td>-0.21</td>
<td>-1.54</td>
<td>-0.55</td>
<td>-0.6</td>
<td>-0.12</td>
</tr>
<tr>
<td>$a_{v}$ (&gt;0)</td>
<td>4727.39</td>
<td>309.25</td>
<td>8992.2</td>
<td>390.4</td>
<td>42%</td>
<td>84%</td>
</tr>
</tbody>
</table>

Notes: Sample: Top seven AGOA exporters
(a) Expected signs from expression (i) in parenthesis. Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%
(b) Estimates in columns 1 to 4, and 6 include a constant, exporter dummies as well as interaction terms between exporter-dummies and EU-dummies. Estimates in column 5 has exporter-importer-product fixed effects.
(c) R² are reported for OLS regressions and McKelvey and Zavoina’s Pseudo R² are reported for Tobit and ET-Tobit regressions.
(d) Low Ramsey RESET test p-values are related to misspecification.

Table 3: Robustness checks

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>1 Temporal</th>
<th>2 Country-specific</th>
<th>3 Alternative. SR</th>
<th>4 Triple Transf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(a_v+X)</td>
<td>ln(a_v+X)</td>
<td>ln(a_v+X)</td>
<td>ln(a_v+X)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>FE Tobit(d) (Trimmed LAD)</th>
<th>FE Tobit(d) (Trimmed LAD)</th>
<th>FE Tobit(d) (Trimmed LAD)</th>
<th>FE Tobit(d) (Trimmed LAD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a Coeff.</td>
<td>1b Approx change in exports (b)</td>
<td>2a Coeff.</td>
<td>2b Approx change in exports (b)</td>
<td>3a Coeff.</td>
</tr>
<tr>
<td>$R^j_{i,t}$</td>
<td>0.194 [0.025]***</td>
<td>21.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R2^j_{i,t}$</td>
<td>0.148 [0.028]***</td>
<td>16.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R3^j_{i,t}$</td>
<td>0.169 [0.028]***</td>
<td>18.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R4^j_{i,t}$</td>
<td>0.068 [0.039]*</td>
<td>7.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$D^j_{Bot} \times R^j_{i,t}$</td>
<td>0.05 [0.048]</td>
<td>5.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$D^j_{Ken} \times R^j_{i,t}$</td>
<td>0.697 [0.105]***</td>
<td>100.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$D^j_{Les} \times R^j_{i,t}$</td>
<td>0.291 [0.067]***</td>
<td>33.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$D^j_{Mad} \times R^j_{i,t}$</td>
<td>0.72 [0.097]***</td>
<td>105.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$D^j_{Mal} \times R^j_{i,t}$</td>
<td>0.168 [0.063]***</td>
<td>18.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$D^j_{Nam} \times R^j_{i,t}$</td>
<td>0.129 [0.070]*</td>
<td>13.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$D^j_{Swa} \times R^j_{i,t}$</td>
<td>0.45 [0.084]***</td>
<td>56.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$RA^j_{i,t}$ (c)</td>
<td>0.333 [0.026]***</td>
<td>39.5%</td>
<td>0.24 [0.03]***</td>
<td>27.1%</td>
</tr>
<tr>
<td>$TT^j_{i,t}$</td>
<td></td>
<td></td>
<td>-0.17 [0.03]***</td>
<td>-15.6%</td>
</tr>
</tbody>
</table>

Observations: 28854 28854 28854 28854

Notes: Estimates include a constant and other dependent variables that are not reported here. The sample includes the 7 largest apparel exporters under AGOA eligible to the SR. All estimates include 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-R² are reported.
(b) $\Delta E \left[ \frac{X^d_{i,t}}{X^d_{i,t}} \right] 1 \Delta \hat{R}_g^d \quad E \left[ X^d_{i,t} \mid X^d_{i,t} > 0, R = 0 \right]$
(c) $RA^j_{i,t} = 1$, for $t > t^*$ where $t^* = 2001$ for Madagascar, Lesotho, and Kenya and $t^* = 2002$ for Swaziland, Namibia, Botswana and Malawi; $RA^j_{i,t} = 0$, otherwise.
(d) Trimmed Least Absolute Deviation (LAD) estimator for fixed effects Tobit models developed by Honore (1992) was implemented with STATA “pantob” ado-file.
Table 4: Count Estimates: Negative Binomial Model

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pooled</td>
<td>pooled</td>
<td>pooled</td>
<td>FE</td>
<td>RE</td>
</tr>
<tr>
<td>$R_{i,j,k}^{t}$ (&gt;0)</td>
<td>0.33</td>
<td>0.36</td>
<td>0.4</td>
<td>0.48</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td>[0.15]**</td>
<td>[0.08]***</td>
<td>[0.12]***</td>
<td>[0.09]***</td>
<td>[0.09]***</td>
</tr>
<tr>
<td>$I_{i,j,k,m,n}^{t}$ (&lt;0)</td>
<td>-0.03</td>
<td>-0.03</td>
<td>-0.03</td>
<td>-0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>[0.01]***</td>
<td>[0.01]***</td>
<td>[0.01]***</td>
<td>[0.01]***</td>
<td>[0.01]***</td>
</tr>
<tr>
<td>ln $Y_i^{t}$ (&gt;0)</td>
<td></td>
<td></td>
<td></td>
<td>-0.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[0.36]</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.93</td>
<td>1.56</td>
<td>7.15</td>
<td>1.97</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>[0.07]***</td>
<td>[0.16]***</td>
<td>[10.66]</td>
<td>[0.14]***</td>
<td>[0.14]***</td>
</tr>
<tr>
<td>Observations</td>
<td>396</td>
<td>396</td>
<td>396</td>
<td>396</td>
<td>396</td>
</tr>
<tr>
<td>Number of groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(importer-exporter pairs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed exporter-specific effects</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Test of overdispersion [H0 : $\theta = 0$ (non-overdispersion)]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chi-2</td>
<td>6522.81</td>
<td>749.56</td>
<td>748.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
Table 4b: Count Estimates: Poisson Regression Model

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>pooled</td>
<td>pooled</td>
<td>pooled</td>
<td>FE</td>
<td>RE</td>
</tr>
<tr>
<td>$R_{i,t}^{j,k}$ ($&gt;0$)</td>
<td>0.33</td>
<td>0.21</td>
<td>0.43</td>
<td>0.41</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>[0.03]**</td>
<td>[0.03]***</td>
<td>[0.05]***</td>
<td>[0.05]***</td>
<td>[0.09]***</td>
</tr>
<tr>
<td>$t_{i}^{k,mfn}$ ($&lt;0$)</td>
<td>-0.03</td>
<td>-0.04</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>[0.01]***</td>
<td>[0.01]***</td>
<td>[0.01]***</td>
<td>[0.01]***</td>
<td>[0.01]***</td>
</tr>
<tr>
<td>$\ln(Y_{i}^{k})$ ($&gt;0$)</td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.14]</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.93</td>
<td>1.58</td>
<td>-2.2</td>
<td>1.65</td>
<td>2.88</td>
</tr>
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<td>[0.01]***</td>
<td>[0.11]***</td>
<td>[4.11]***</td>
<td>[0.11]***</td>
<td>[0.15]***</td>
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<tr>
<td>Observations</td>
<td>396</td>
<td>396</td>
<td>396</td>
<td>396</td>
<td>396</td>
</tr>
<tr>
<td>Number of groups</td>
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<tr>
<td>(importer-exporter pairs)</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fixed exporter-specific effects</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

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