

University of Toronto  
Department of Economics



Working Paper 289

Trade Growth under the African Growth and Opportunity Act

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June 18, 2007

# Trade Growth under the African Growth and Opportunity Act

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## Abstract

This paper explores whether one of the most important U.S. policies towards Africa of the past few decades achieved its desired result. In 2000, the United States dropped trade restrictions on a broad list of products through the African Growth and Opportunity Act (AGOA). Since the Act was applied to both countries and products, we estimate the impact with a triple difference-in-differences estimation, controlling for both country and product-level import surges at the time of onset. This approach allows us to better address the ‘endogeneity of policy’ critique of standard difference-in-differences estimation than if either a country or a product-level analysis was performed separately. Despite the fact that the AGOA product list was chosen to not include ‘import-sensitive’ products, and despite the general challenges of transaction costs in African countries, we find that AGOA has a large and robust impact on apparel imports into the U.S., as well as on the agricultural and manufactured products covered by AGOA. These import responses grew over time and were the largest in product categories where the tariffs removed were large. AGOA did not result in a decrease in exports to Europe in these product categories, suggesting that the U.S.-AGOA imports were not merely diverted from elsewhere. We discuss how the effects vary across countries and the implications of these findings for aggregate export volumes.

*JEL codes:* F13, F14, F15, O19

*Keywords:* trade liberalization, sub-Saharan Africa, policy evaluation

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# 1 Introduction

The overwhelming challenge in improving the human condition today is the challenge of development on the African continent. One of many factors cited for inhibiting the development of Africa and other low-income countries has been the trade barriers imposed by high-income countries on the imports of commodities in which poor countries are likely to have a comparative advantage: textiles and agricultural products in particular. This paper explores whether these trade barriers have actually mattered—that is, where they have been removed, have exports from Africa increased?

The paper takes advantage of a unilateral granting of trade concessions to the majority of sub-Saharan African countries by the United States in the form of the African Growth and Opportunity Act (2000). These trade concessions were uniform across all the African countries that were deemed eligible for AGOA.<sup>1</sup> The concessions fall into two categories: apparel and non-apparel items; details on the implementation for each category will be described later. While the products allowed duty-free and quota-free access under AGOA were uniform across eligible countries, the set of products was not comprehensive. Therefore, since AGOA applied selectively to both countries and products, but not to all countries, nor to all products, this implementation allows for triple difference-in-differences estimation of the impact of the policy. As a result, we can muster a more robust defense to the endogeneity critique that applies to some difference-in-differences estimation (Besley and Case, 2000).

To examine the benefits of triple-difference estimates, consider how the endogeneity critique would apply if either a country or a product-level analysis was performed separately. At the country-level, suppose that countries were given AGOA-eligibility just as their economies started to improve, for example when the normal state of affairs is restored after a civil war. This might result in an increase in U.S. imports from this country at the same time as the country gained eligibility, although the imports might just result from the overall boost in the exporter’s economy.<sup>2</sup> The country-by-country difference-in-differences estimator would erroneously attribute the positive export effect to AGOA. At the product-level, suppose that the U.S. granted AGOA product status to those products for which its demand was about to increase.<sup>3</sup> Here again, a product-by-product difference-in-differences estimator would at-

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<sup>1</sup>The main criteria for AGOA eligibility relate to a basic level of political and democratic freedom within the country. Countries excluded from AGOA as of January 2, 2007 include: Zimbabwe, Cote d’Ivoire, Somalia, Sudan, Central African Republic, Eritrea, Comoros, Equatorial Guinea, Mayotte, Togo.

<sup>2</sup>In practice, there was some variation across countries in eligibility date and even more so for the apparel provision in AGOA.

<sup>3</sup>To preview the results, U.S. worldwide imports of oil (a product given duty-free access under AGOA) were considerably higher post-AGOA.

tribute a positive effect to AGOA if the general import surge for eligible products simply extended to countries that were included in the Act.

We will be able to address these critiques. The increase in imports into the U.S. of a specific AGOA-eligible product from an AGOA-eligible country during the AGOA period will be measured relative to: (i) the overall increase in imports from that country, (ii) the overall increase in imports of that product, and (iii) the base level of imports of AGOA products from AGOA countries. In fact, the preferred specification will be even more general than this, allowing for a full set of country-product, country-year, and product-year fixed effects.

While this product and country variation in eligibility clearly has its advantages in terms of isolating the impact of AGOA, it also has its limitations. For example, suppose that the U.S. administration chose to implement tariff concessions on products that African countries would have little hope of exporting to the U.S. (e.g. because of a lack of comparative advantage). The AGOA legislation explicitly allows the President only to grant duty-free treatment for non-apparel articles “after the U.S. Trade Representative and the U.S. International Trade Commission have determined that the article is not import sensitive when imported from African countries,”<sup>4</sup> which suggests that such selective implementation was indeed possible. The effect of tariff concessions applied in such selective fashion will differ from a widespread free-trade agreement. For this reason, it is not self-evident that one would find positive effects from AGOA, and finding no effect in this case cannot be interpreted more generally as no effect from broad trade liberalization.

A second reason why one might not expect positive effects from AGOA is that many have argued (see below) that trade restrictions are not the primary constraint on African exports. For example, Collier and Gunning (1999) identify the chief factors explaining Africa’s poor economic performance as distorted product and credit markets, high risk, inadequate social capital, inadequate infrastructure, and poor public services. External factors such as developed countries’ trade restrictions are not considered as important. Therefore, the internal factors may continue to constrain African exports after the removal of the U.S. import restrictions. Moreover, the largest expected benefit of AGOA was its reduction of apparel tariffs and quotas, even though most African countries did not have apparel quotas for import into the U.S. It is not clear that removal of the quotas would matter.

We find that AGOA has a large and robust impact, especially on apparel imports into the U.S., but also for manufactured products treated by AGOA, and a smaller but significant impact for agricultural products. These import responses grew over time and were the

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<sup>4</sup>The quotation is taken from a summary of the AGOA Legislation at the U.S. Government AGOA website at <http://www.agoa.gov>.

largest in product categories where the tariffs removed were large. AGOA did not result in a decrease in exports to Europe in these product categories, suggesting that the U.S.-AGOA imports were not merely diverted from elsewhere. When we estimate country-specific export responses, we find a broad-based response to AGOA, particularly for manufactured products. We also find that countries with high corruption or poor rule-of-law were equally able to take advantage of AGOA as countries with low corruption and better institutions.

Finally, one reason that the impact of AGOA in apparel exports was expected to be limited or short-lived was the phaseout of the Multi-Fiber Arrangement (MFA) on January 1, 2005. At this point, import quotas for apparel imports were eliminated for competing developing countries as well. Newspapers predicted that most apparel production would shift to China.<sup>5</sup> In addition, most analysts predicted that Chinese and other Asian competition would overwhelm the less efficient African apparel exporters and seriously damage African apparel exports to the U.S. after this point (Harrison, Rutherford, and Tarr, 1997; Lall, 2005; Cling et. al., 2005; Nordås, 2004; Rivera, Agama and Dean, 2003; Mattoo et. al., 2003; Gibbon, 2003). Our dataset extends until 2006, and perhaps surprisingly, we find that AGOA had the largest effect on apparel exports in the last two years of the sample.

The importance of African development has at different times been emphasized by world leaders, and this has led to a variety of policy statements and initiatives, including the New Partnership for Africa’s Development and debt relief. AGOA was such an effort, in this case a unilateral effort of the U.S. Administration under President Clinton, which has since been renewed by the Bush Administration. This paper evaluates whether this initiative had any impact. The remainder of the paper is organized as follows. Section 2 gives background information on the U.S. system of trade preferences and discusses the relevant literature. Details on the implementation of the Act are in Section 3. The empirical specification is introduced in Section 4 and the data in Section 5. Results are in Section 6 and robustness checks follow in Section 7. Implications of the results are discussed in Section 8 and Section 9 concludes.

## 2 Background

This paper measures the impact of the expansion of U.S. trade preferences on exports from African countries. Other studies have explored the impact of both free-trade agreements

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<sup>5</sup>There are literally hundreds of newspaper articles on this specific issue. See for example “Thirty million jobs could disappear with the end of apparel quotas,” *Business Week*, December 15, 2003, for a U.S. perspective, and “Textiles Trade Reform: Unstitched by China, WTO,” *Business Day*, October 21, 2004 for a South African perspective.

and expanded trade preferences, with varying conclusions.<sup>6</sup> In the African context, Carrère (2004) examines the impact of the five major African regional trade agreements and two major currency unions in Africa over the period 1962 through 1996 and finds that they increased trade between members.

Here, we evaluate the impact of non-reciprocal trade preferences rather than a reciprocal free-trade agreement. One might expect a smaller trade liberalizing effect, as the U.S. did not obtain anything in exchange for its concessions, and as mentioned, the law required that the items included on the AGOA list not be ‘import sensitive’. The major preference regime offered by most developed countries to imports from developing countries is the Generalized System of Preferences (GSP)—the rule for eligibility is typically set by an income threshold. Rose (2004) finds a significant effect of the GSP on trade volumes, but an insignificant effect of the GATT/WTO. Romalis (2003) finds additionally that GDP growth rates of countries most affected by the establishment of the GSP increased significantly. AGOA involves the addition of a large number of products to the U.S. version of the list of products that are offered duty-free access.

Hoekman *et al.* (2002) studies the potential effects of the removal of tariffs on high-tariff items (above 15 percent) in the United States, Japan, Europe and Canada on exports from least developed countries (LDCs). They predict large effects on LDC exports, on the order of 11 percent of total exports. Similarly, Ianchovichina *et al.* (2001) explores the potential impact of preferential market access for a set of 37 Sub-Saharan African countries to the European Union, Japan, the U.S. and Canada, and finds that African exports would increase considerably, by approximately 14 percent, if such access were granted. In contrast, the products added to the GSP list under AGOA had an average tariff rate of only 4.1% and the expected impact is likely to be much smaller.<sup>7</sup>

Several other papers have suggested that the impact of AGOA could well be very limited. As already noted, Collier and Gunning (1999) does not consider developed country tariffs as significant impediments to growth in Africa. Limão and Venables (2001) finds that the relatively low level of African trade flows “is largely due to poor infrastructure.” (p. 451) Rodrik (1998) studies the possible causes of poor export performance in Africa, and suggests that the dominant causes are low levels of per capita income, small country size,

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<sup>6</sup>For example, Romalis (2005), Treffer (2004), Burfisher *et al.* (2001), Clausing (2001), and Head and Ries (1997) examine the North American Free Trade Agreement or the Canada-U.S. Free Trade Agreement; Greaney (2001) examines U.S.-Japan bilateral trade agreements, and Frankel *et al.* (1995) examines the impact of regional trading blocs.

<sup>7</sup>The tariff rate is measured as an average of the ad valorem tariff rate and the ad valorem equivalent for specific tariffs.

poor geography, and domestic (African) trade policy. Morrissey (2005) notes that "there are many explanations as to why the export response to trade liberalisation in SSA has been limited," (p. 1145) and he highlights a few, including transport costs and natural barriers to trade. Wang and Winters (1998), in summarizing a set of World Bank technical papers, finds that "the evidence suggests that it is African countries' own trade policies and not those of their partners that must be changed in order to promote growth," a view echoed by Yeats *et al.* (1996).

Still, in one case where an African country has liberalized its trade policy, in Uganda, it has not immediately led to expanded exports; see Morrissey and Rudaheranwa (1998). Specifically, they find that despite the abolition of export taxes, significant liberalization on imports, and the liberalization of the foreign exchange market, export earnings did not increase. Milner *et al.* (2000) offers a partial explanation, as they find that for Uganda even after export taxes are abolished, transport costs remain a significant constraint on trade. Overall, then, there are a number of reasons why AGOA might not have (much of) an impact in the African context.

To our knowledge, Mattoo *et al.* (2003), Gibbon (2003), and Brenton and Ikezuki (2004) are the only other studies of the impact of AGOA. Mattoo *et al.* (2003) predicted the effects *ex ante* using information on pre-AGOA tariffs and assumptions on supply responses. Their conservative estimate was that AGOA would raise Africa's non-oil exports by 8–11 per cent. For a country like Mauritius they expected exports to rise by only 5% from 2001 to 2004. Absent the rules of origin requirements on yarn, which Mauritius turned out to be exempted from, an export increase of 36% was expected. For a lesser developed country such as Madagascar, they assumed a five times higher (export) supply response and predicted an export increase for textiles of 92%.

Gibbon (2003) analyzes the initial AGOA response (in 2002) in the South African apparel sector from a global commodity chain/global value chain (GCC/GVC) perspective, providing an explanation within that context of the kind of enterprises that could take advantage of AGOA. Brenton and Ikezuki (2004) advocate the renewal of the unrestricted fabric-sourcing rules of AGOA that were set to expire when their paper was written—which did happen. Using data up to 2002, they show increased exports of AGOA-eligible products for some countries, but they also provide suggestive evidence that the rules-of-origin requirements depress exports and lead to underutilization of existing preferences.

### 3 The Implementation of AGOA

When the Act was first implemented on October 2, 2000, it applied to 34 countries in Sub-Saharan Africa. By January 2, 2007, eight more countries had been added to the list, and four countries had been removed. The newer countries, such as Sierra Leone, have generally been admitted after government stability was achieved. Four countries, the Central African Republic, Eritrea, Côte d’Ivoire, and Mauritania, have been removed from AGOA as a result of failures regarding political or democratic freedoms.<sup>8</sup> The first three of these removals occurred during the period of our dataset.<sup>9</sup>

The Act allows for duty-free imports under two broad categories: apparel and non-apparel. For non-apparel, approximately 1800 items were added to the list of products with zero import duty under the Generalized System of Preferences (GSP). As a result, for AGOA countries the number of goods on the U.S. GSP list expanded from 4600 to more than 6400 items, defined at the 8-digit HS (Harmonized System) level. We will refer to these items as GSP products. As soon as a country is declared AGOA eligible, it can export any of these items duty-free to the U.S.<sup>10</sup>

On the other hand, duty-free access for apparel exports from an African country is not automatic as soon as AGOA-eligibility is granted. The first countries to be declared eligible for the ‘apparel provision’ were Kenya and Mauritius on January 18, 2001, three months after most countries were admitted to AGOA. Countries have been ‘admitted’ to the apparel provision at various times over the subsequent years. The apparel provision allows for duty-free and quota-free access to the U.S. market for most apparel products, provided that the fabric (or yarn, or thread) comes either from the U.S. or an AGOA country. While the country-level quotas have been removed, a regional (AGOA) quota remains for apparel that was initially set at 1.5% of U.S. imports, increasing to 3.5% over an 8 year period. These caps were doubled under a set of amendments, called AGOA II, and the new set of caps have not proved binding.

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<sup>8</sup>The Central African Republic (January 1, 2004) and Mauritania (January 1, 2007) were both removed after coups. Eritrea (January 1, 2004) was removed after failing to implement elections and democratic reforms. Côte d’Ivoire (January 1, 2005) was removed after failing to implement a peace plan.

<sup>9</sup>In virtually all specifications, we will use country-product and country-year fixed effects to control for country-specific effects.

<sup>10</sup>For some of the ‘least developed beneficiary countries’, the pre-AGOA GSP list already contained a number of the products added to the GSP list for all AGOA countries by the Act. We follow the more conservative approach of including these product-country pairs as treated under AGOA. The alternative approach, treating these product-country pairs as unaffected by AGOA, increases the point estimates of the AGOA effect by approximately one quarter. Also, some agricultural products subject to tariff-rate quotas remained subject to out-of-quota duties.



In addition to the governance provisions required for admission to AGOA, countries seeking access to the apparel provision must prove to the U.S. that they have an effective visa system to verify and enforce the source of the fabric or yarn used in apparel production. Once countries qualify for the apparel provision, they can also be considered for the ‘special rule’ for apparel. This special rule was designed to apply to ‘lesser developed’ AGOA countries, and allowed them to source their fabric or yarn from anywhere in the world.<sup>11</sup> As of January 2, 2007, South Africa was the only country of the twenty-seven that were (or had been) eligible for the apparel provision that did not qualify for the special rule (either by rule or exception granted).

## 4 Empirical specification

We will examine whether AGOA—a trade liberalization in the form of unilateral trade concessions granted by the U.S. to a set of African countries—has had any impact on the volume of African exports. Any of the standard trade models would predict that if these concessions were applied to products that African countries were either already exporting or to products that they should export given their comparative advantage or factor endowments, then the volume of these exports would increase under AGOA. Therefore, no formal model is presented, as this prediction would apply to a wide class of models indeed.

The simplest (but most restrictive) triple-difference regression specification to measure the size of the AGOA effect is the following:

$$\begin{aligned} \ln IMP_{cpt} = & (\alpha_1 + \beta_1 Ineffect_t) * AGOA\_country_c * AGOA\_product_p + \\ & (\alpha_2 + \alpha_3 Ineffect_t) * AGOA\_country_c + \\ & (\alpha_4 + \alpha_5 Ineffect_t) * AGOA\_product_p + \\ & \alpha_6 Ineffect_t + \varepsilon_{cpt}, \end{aligned} \quad (1)$$

where the variables are defined as follows. The left-hand side variable refers to the imports into the U.S. of product  $p$  from country  $c$  during period  $t$ . Since the paper is measuring the impact of a U.S. policy, all trade volumes will be imports into the U.S., as reported by the U.S. The variable  $AGO A\_country_c$  is a time-invariant dummy that takes a value of one if a country is ever declared AGOA-eligible. Similarly, the variable  $AGO A\_prod_p$  is a time-invariant dummy that takes a value of one for products eligible for duty-free import under

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<sup>11</sup>Officially, the rule is defined as having a per capita GNP below \$1500 in 1998 as measured by the World Bank.

AGOA. The  $Ineffect_t$  variable is a dummy that switches from zero to one—for all countries and products—in 2001, when AGOA takes effect.

The intuition behind this specification can best be seen when only two years are considered, one year prior to AGOA, say 1999, and a second year when AGOA is in effect for some countries and products, say 2003. The implementation of AGOA contains variation along three dimensions: (i) between time periods (pre and post), (ii) between products, and (iii) between countries. Therefore, if we define  $AP$  as an AGOA product and  $NP$  as a non-AGOA product, the triple difference (DDD) used to measure the effect of the Act is:

$$\begin{aligned}
 DDD = & \underbrace{((\ln IMP_{03}^{AP} - \ln IMP_{99}^{AP}) - (\ln IMP_{03}^{NP} - \ln IMP_{99}^{NP}))}_{AGOA \text{ Country} - DD} \\
 & - \underbrace{((\ln IMP_{03}^{AP} - \ln IMP_{99}^{AP}) - (\ln IMP_{03}^{NP} - \ln IMP_{99}^{NP}))}_{Non-AGOA \text{ Country} - DD}
 \end{aligned} \tag{2}$$

The standard difference-in-differences approach, used for example when measuring the effect of tariff preference given to a single country, is the first difference-in-differences (DD) term, labelled *AGOA Country-DD*. This measures the *difference in the pre-post differences* in imports between AGOA and non-AGOA products within an AGOA country. Implicitly, the AGOA products are the treatment group, and the non-AGOA products the control group of the first DD experiment. By comparing this first difference-in-differences within the AGOA country to the equivalent difference-in-differences in a non-AGOA country (the second term) we can additionally control for product-specific trends that are common to treated (AGOA) and untreated countries.

Therefore, the simplest way of expressing the triple difference in (2) in regression form is to regress imports on three dummy variables, one for each difference ( $Ineffect_t$  for the AGOA implementation period,  $AGOA\_product_p$  for AGOA products, and  $AGOA\_country_c$  for AGOA countries), as well as the three double interactions of these variables, and the single triple interaction. This is exactly the specification of (1). The effect of AGOA will be measured by the triple interaction. However, this specification is very restrictive. It does not allow for much country or product-level heterogeneity in the base-level of imports into the U.S. All country-product combinations are lumped in four exclusive groups: ineligible products from non-AGOA countries, eligible products from AGOA countries, eligible products from non-AGOA countries, and ineligible products from AGOA countries. Each group is restricted to have a single base level of imports. In addition, it assumes that the post-AGOA surge in U.S. imports was the same for all AGOA countries and for all eligible products.

Relaxing these assumptions, our preferred, entirely unrestricted, specification is:

$$\begin{aligned} \ln IMP_{cpt} = & \beta_1 Ineffect_t * AGOA\_country_c * AGOA\_product_p + \\ & + country/product_{cp} + country/year_{ct} + product/year_{pt} + \varepsilon_{cpt}. \end{aligned} \quad (3)$$

The only coefficient estimated (aside from all the fixed effects) is the one of interest, namely that on the triple interaction ( $Ineffect_t * AGOA\_country_c * AGOA\_product_p$ ). The double-interaction terms of (1) are replaced with three sets of interactive fixed effects, which allow for heterogeneity in (i) the base level of imports of a specific product from a specific country ( $country/product_{cp}$ ), (ii) the overall imports from a given country into the U.S. in a given year ( $country/year_{ct}$ ), and (iii) the overall imports of a particular product into the U.S. in a given year ( $product/year_{pt}$ ). Including these double-interaction fixed effects obviates the need for both the uninteracted variables ( $AGOA\_product_p$ ,  $AGOA\_country_c$ , and  $Ineffect_t$ ) as well as the double-interaction terms in specification (1).<sup>12</sup> For comparison purposes, we also report results for more restrictive specifications, including that of (1), in the robustness checks of Section 7.

Two further issues complicate the analysis. As mentioned before, AGOA treats apparel products differently from all other products that fall under the Act. Therefore, it would be implausibly restrictive to constrain the effects to be of the same magnitudes for both groups of products.<sup>13</sup> Therefore, two sets of the variables in (3) are included in the full specification: one for AGOA-GSP products<sup>14</sup> ( $GSP$ ) and one for apparel products ( $APP$ ). Second, while for GSP products the Act came into effect at approximately the same time for the vast majority of countries, this is not the case for the apparel provision. In order to account for the additional time-variation in country-eligibility for AGOA, the timing of the two  $Ineffect_t$  variables used in the interaction terms will be country-specific as well.

The full specification for the benchmark estimation is given by

$$\begin{aligned} \ln IMP_{cpt} = & \beta_1 Ineffect\_GSP_{ct} * GSP\_country_c * GSP\_product_p + \\ & \delta_1 Ineffect\_APP_{ct} * APP\_country_c * APP\_product_p + \\ & + country/product_{cp} + country/year_{ct} + product/year_{pt} + \varepsilon_{cpt}. \end{aligned} \quad (4)$$

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<sup>12</sup>In our notation, variables are preceded by a coefficient (in Greek letters), while entries not preceded by coefficients indicate sets of dummies.

<sup>13</sup>A further reason for a differential effect for apparel products under AGOA is the removal of apparel quotas. However, only two countries, Kenya and Mauritius, were subject to quota restrictions prior to AGOA.

<sup>14</sup>Hereafter we will refer to the first group simply as GSP products. In the empirical implementation, we will additionally allow for different effects across subcategories of the GSP products. For simplicity, that discussion is postponed until Section 6.

Two time-invariant product dummies are now used,  $GSP\_product_p$  for the non-apparel products added to the GSP list under AGOA, and  $APP\_product_p$  for apparel. Two time-invariant country dummies also distinguish between countries that at any point in time fall under the Act ( $GSP\_country_c$ ) and the subset of these countries that, at some point, were additionally declared eligible for the apparel provision ( $APP\_country_c$ ).

In specification (4) the  $Ineffect_t$  variable has been replaced by two separate variables, which are made country-specific, i.e.  $Ineffect\_GSP_{ct}$  and  $Ineffect\_APP_{ct}$ . To measure the effect of AGOA on import growth for eligible products in eligible countries—the triple interaction term—the actual time the Act has been in effect in each country is taken into account. As outlined in the previous section, while 34 countries were admitted together on October 2, 2000, eight more countries were admitted more recently.<sup>15</sup>

The coefficients of interest are  $\beta_1$  and  $\delta_1$ .  $\beta_1$  estimates the impact of non-apparel access under AGOA and  $\delta_1$  estimates the impact of the apparel provision. Both triple interactions are implicitly measured relative to the three double interactions (country-time, product-time, country-product), as well as the level effects of the individual variables. For example,  $\beta_1$  measures the surge in imports for GSP products coming from AGOA eligible countries when the Act was in effect relative to a country-product specific base level of imports pre-AGO. The effect is measured controlling for overall import surges from AGOA countries, and general U.S. import surges for GSP products.<sup>16</sup>

The discussion thus far has focused on the response of import levels when products become eligible for duty-free imports. Products for which African countries have positive export levels to the U.S. in spite of tariffs and quotas are likely to be products in which these countries have a strong comparative advantage. Most countries do not export the majority of products. Undoubtedly this reflects to a large extent comparative advantage, but it is also influenced by U.S. trade policy. The removal of import duties and quotas might lead countries to start exporting a wider range of products to the U.S.

As we include zero import observations in the estimation of equation (4), the estimated effect of a change to duty-free status will include both the response at the intensive margin—increased exports—and the extensive margin—starting to export. It is unlikely that both effects are of the same magnitude, which is implicitly assumed. We use a linear probability model to isolate the extensive margin response of the export decision. The dependent variable is a dummy variable that takes the value of one if the country-product-time observation has

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<sup>15</sup>The effect of the Act truly did not begin until 2001, as the President did not announce (and make official) the list of AGOA-GSP products until December 21, 2000, and, as noted, none of the countries were eligible for the apparel provision until 2001.

<sup>16</sup>In the more restrictive specification (1), the surges are captured by the  $\alpha_3$  and  $\alpha_5$  coefficients.

positive imports into the U.S. and zero otherwise. The right-hand side of equation (4) is unchanged and estimation is still with least squares. The advantage of the linear probability model is that we can keep the very general set of fixed effects. The main disadvantage, that predicted values are not restricted to lie on the (0,1) interval, is unlikely to be much of an issue as all coefficients are identified off the time variation within country-product categories. Conditional on the country-product controls, the effect of trade liberalization on the export probability is likely to be relatively small.

A third variation on the benchmark specification is designed to measure the import elasticity with respect to changes in tariff rates. Import tariffs on all AGOA eligible products are eliminated entirely, but initial rates of protection differed widely by product. As a result, the extent of trade liberalization also varies widely.

Multiplying the triple-interaction effects in (4) by the pre-AGOA tariff rates that the U.S. applied to each country-product observation will allow us to recover the marginal response of imports to changes in protection. The  $\beta_1$  and  $\delta_1$  coefficients in this specification measure the percentage import response to one percentage point change in tariffs, instead of the full import response from a change to duty-free status. We can look at the same effect in the linear probability regressions to measure the response to tariff changes at the extensive margin.

## 5 Data

The trade data is taken from the U.S. International Trade Commission. The dependent variable for most of the analysis is the log import of a particular product from each country in the world into the U.S., as reported by the U.S., in each year from 1998 to 2006. If nothing is reported, imports are set to zero.<sup>17</sup> For the regressions that look at the extensive margin a dummy variable is created that takes the value of one if imports are positive.

The list of non-apparel products that are added to the GSP list by AGOA is published by the U.S. Trade Representative, as is the list of apparel products eligible for AGOA treatment.<sup>18</sup> The list of AGOA-eligible countries, including whether they qualified for the apparel provision and the date they became eligible is available from the U.S. International Trade Administration.<sup>19</sup>

We use the U.S. International Trade Commission import data and work at the HS 6-

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<sup>17</sup>To create the dependent variable, we follow the usual practice of adding one unit (dollar) to all import values before taking logarithms.

<sup>18</sup>These lists are available on the U.S. Trade Representative web site at <http://www.ustr.gov>.

<sup>19</sup>The list is available on the ITA-sponsored web site: <http://www.agoa.gov>.

digit level of aggregation.<sup>20</sup> The Act defines apparel products treated under AGOA at the HS 6-digit (or higher) level, while non-apparel product codes of the AGOA-GSP list are at the 8-digit level. To capture this fact, the *GSP\_product<sub>p</sub>* variable is not a dummy, but varies continuously between 0 and 1. It is constructed to represent for each 6-digit product the fraction of underlying 8-digit products (by value) that are eligible for duty-free imports. In the aggregation, eligibility dummies at the 8-digit level are weighted by the share of U.S. worldwide imports in each subcategory in the pre-AGOA period.<sup>21</sup> In contrast, the *APP\_product<sub>p</sub>* variable is always a 0-1 dummy, as the products that fall under the apparel provision are defined at an aggregation level of 6-digits or even higher.

The data on tariffs is taken from Feenstra, Romalis, and Schott (2002).<sup>22</sup> The tariff rates are set at the 8-digit level and we aggregate them to the 6-digit level using the same weights as for the AGOA-GSP eligibility dummies. As mentioned previously, the tariff rates are measured either as the ad valorem tariff or the ad valorem equivalent for specific tariffs.

Summary statistics for 2000, the year before AGOA took effect, are in Table 1. AGOA countries export fewer products and smaller amounts than the average country, which is not surprising given their small size and low level of development. From the universe of 5120 products, the average AGOA country has positive exports in 102 and 28 fall under the Act. The average AGOA country exports 14.02 of the 862 eligible GSP products, three quarters of which are manufactures. For apparel products, the average exposure is higher, 14.37 out of 239 products, but the set of apparel-eligible countries is smaller. The most prolific exporter (South Africa) exports 120 apparel products and 232 of the GSP products. Average trade-weighted tariff rates are highest for apparel, at 13.1%. On the set of country-product combinations with positive tariff rates, protection was highest for manufacturers, at 8.5%, followed by agricultural products, at 7.7%. For GSP products, a number of the poorest AGOA countries were already exempt from duties (see footnote 10).

⇒ [Table 1 approximately here] ⇐

In the robustness checks (discussed below), we estimate the equations without the large set of fixed effects. To control for some country heterogeneity, we use a number of standard

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<sup>20</sup>Note that at this level our preferred specification already requires approximately 1.2 million fixed effects. Working at an even more disaggregate level would introduce mostly zero-import observations for the African economies.

<sup>21</sup>In theory, aggregation will provide a consistent, if inefficient, estimate of the effects of AGOA-GSP. In practice, the average of the *GSP\_product<sub>p</sub>* variable for treated products is 0.74, with more than half taking on the value of 1. Within the 6-digit categories, the treated 8-digit categories significantly outweigh the untreated 8-digit categories.

<sup>22</sup>Considerable thanks are due to these authors for making this data available at <http://www.nber.org/data>. As the tariffs drop to zero with AGOA, we only need the tariffs prior to the Act to analyze the effect.

variables that have been found to predict trade volumes well in the gravity equation literature. The distance between two countries is calculated as the great circle distance between capital cities. Other country-level variables are taken from the 2006 World Development Indicators database.

## 6 Results

The results for equation (4) with a full set of country-product, country-year, and product-year fixed effects, estimated on the full balanced panel of all countries worldwide for all products, from 1998 to 2006 are in column (1) of Table 2. The coefficient  $\delta_1$  on the triple-interaction term for apparel measures the effect of the apparel provision on imports into the U.S., and the coefficient  $\beta_1$  measures the effect of the non-apparel concessions under AGOA for products added to the GSP list. The effect is identified from the change in pre versus post-AGOA import levels for each country/product category, controlling for the baseline import level and general country and product import surges that can vary by year. The estimates indicate that the apparel provision in AGOA is associated with a 53% increase in imports into the U.S. For GSP products, AGOA raises imports by 14%.

$\Rightarrow$  [Table 2 approximately here]  $\Leftarrow$

To compare, the difference-in-differences results are presented in columns (2) through (4). In column (2), the sample is limited to just AGOA countries, and so focuses on the difference between AGOA and non-AGOA products (the difference-in-differences in the first line of equation (2)). As in the triple-difference estimation, a full set of country-product fixed effects is included. Country-year dummies are also included, to allow for the differential timing of AGOA across countries, but we have to omit the product-year dummies. This estimator identifies the AGOA effect solely from the relative import growth for AGOA and non-AGOA products. The apparel effect is slightly overestimated at 57% instead of 53%, indicating that U.S. import demand for apparel products increased for non-AGOA countries as well. The AGOA-GSP effect is underestimated at -2.2%, indicative of an inverse U.S. demand effect for these products.

The difference-in-differences method can also be implemented by restricting the sample to AGOA treated products, but including all countries. We examine GSP products separately from apparel because the set of countries qualifying differs. This way, we use the treated

products in untreated countries as control group.<sup>23</sup> The full set of country-product and product-year fixed effects are included, but now we have to omit the set of country-year dummies. The apparel effect, in column (3), becomes 38% and is still significant; the AGOA-GSP effect, in column (4), becomes 0.4% and insignificant. Both of these underestimate the impact of AGOA, as the estimates fail to take into account the overall drop in U.S. imports from AGOA countries, for AGOA and other products alike.

Finally, in the last column in Table 2 we report the effects of AGOA on the probability that an eligible country exports a product to the U.S. For products under the apparel provision the probability is increased by 3.0% in the post-AGOA period. In terms of economic magnitude, this effect is large compared to an average probability of 23.5% for all countries worldwide and 6.0% for AGOA countries prior to the Act. The GSP effect is also positive and significant. The probability that an AGOA country exports a GSP product to the U.S. is increased by 1.0%; again an extremely large change relative to an average probability of 9.8% for all countries worldwide and 1.6% for AGOA countries prior to the Act.

The results of Table 2 measure the average effect of AGOA in the years following its implementation. We examine the timing of the effects by interacting the triple interaction with year dummies for each of the AGOA years, separately for apparel and GSP products. The results of this estimation are in Table 3. Most AGOA countries are eligible for duty-free treatment on GSP products at the outset of AGOA in January of 2001, and so the progress of the AGOA-GSP effect can be measured over the six years 2001 through 2006. On the other hand, since twelve of the twenty-six countries ever declared eligible for the apparel provision are declared such in the latter half of 2001 and the first half of 2002, we chose 2002 for the average onset of the apparel provision.<sup>24</sup> Therefore, there are only five years of AGOA apparel implementation to consider.

For both sets of products, the impact of AGOA grows significantly over time, from 24.6% to 57.1% for apparel products, and from 6.6% to 26.9% for GSP products. Again, this can be the result of starting to export in new product categories or expanding exports within the existing categories. Results in the second column indicate that there is an important change at the extensive margin. The increase in the probability of exporting a product rises over time, from 1.8 to 3.0% for apparel, and from 0.5 to 1.9% for GSP products. Especially for

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<sup>23</sup>In the triple-difference results of column (1), the ‘control’ group for both apparel and GSP products is the set of non-apparel, non-GSP products. In columns (3) and (4), we perform the analysis separately for GSP and apparel products. Otherwise, we would lump import changes for apparel and GSP imports from non-AGOA countries together in the control group.

<sup>24</sup>Of the remaining thirteen, just five were declared eligible in the first half of 2001, with the remaining eight declared eligible later than 2002.



the last category, this response is extremely large. From 2000 to 2006 the probability a GSP product is exported to the U.S. approximately doubles.

For apparel products, the major expansion in product lines happened in the first two years, and has not increased since then, although the volume in these product lines has continued to increase. For GSP products, the estimate of the AGOA impact in the final year of our sample (26.9%) is considerably larger than the average effect captured over the six years of AGOA impact (13.5% from Table 2). The effect also keeps growing over time, consistent with the large response at the extensive margin for these products.

The apparel results are most striking when they are placed in context of the dismantling of the Multi-Fibre Arrangement (MFA) quotas on January 1, 2005 (Year 4 of the apparel implementation), as described earlier. Only two African countries, Kenya and Mauritius, had been subject to these quotas before they were dropped for AGOA countries at the outset of AGOA. The primary effect of the end of the MFA was expected to be increased competition from Asia, particularly China. Nevertheless, AGOA countries increased their apparel exports in 2005. Although exports dropped slightly in 2006, the AGOA apparel effect remained larger than for 2004 or earlier years of the program.

⇒ [Table 3 approximately here] ⇐

To this point, we have assumed that the impact of AGOA treatment is the same across subcategories of GSP products. We now relax this assumption. The 1835 8-digit HS products added to the GSP list under AGOA can be categorized as agricultural (617 products), minerals (4), petroleum and related products (11), and manufacturing, including chemicals (1203). The rules and timing of the trade liberalization are identical for each subcategory. Allowing heterogeneous AGOA-treatment effects for these subcategories simply requires replacing the  $GSP\_product_p$  term in equation (4) with 4 terms—one for each of the subcategories: agriculture, minerals, petroleum, and manufacturing.

Table 4 repeats the triple-interaction specifications of Table 2, allowing for heterogeneous effects. Obviously, the effect on apparel exports does not change, but for the GSP subcategories there are considerable differences. The petroleum and mineral effects are insignificant. Most of the AGOA-GSP products were agricultural products (617) or manufactured products (1203), and we find that both the agricultural and manufactured product category effects are positive and significant. AGOA resulted in a 8.3% increase in imports for GSP-Agricultural products, and a 15.7% increase for GSP-Manufactured products.

⇒ [Table 4 approximately here] ⇐

The second column explores the effect of AGOA on the probability of exporting a particular product. Here, the signs, significance, and relative magnitude of the effects mirror the results in the first column, but some of the absolute magnitudes are surprisingly large. The probability that an AGOA country exports a GSP-Agriculture product increases by 0.7%, relative to a baseline percentage for AGOA countries for these products of only 1.3% (and 7.4% in this category for all countries) prior to AGOA. That is, the probability of exporting these agricultural products rises by more than one half for AGOA countries. For minerals, the AGOA-related increase is 1.5%, relative to a baseline of 0 (only 4 products here) prior to the Act for AGOA countries, and 1.6% for all countries prior to the Act. The point estimate for GSP-Petroleum products is large, but estimated highly insignificantly. For GSP-Manufactures, the probability of exporting increased by full 1.2% as a result of AGOA, relative to a baseline of 1.8% for AGOA countries prior to the Act. A two-thirds increase!

In sum, we find that the Act increased apparel trade very substantially, while the import responses of manufactured products in particular are relatively large as well. While AGOA countries export notably fewer products than most other countries, this gap decreased tremendously following the Act. The large increase in the probability of exporting is consistent with the AGOA effect growing over time, especially for GSP products.

Next, we additionally multiply the triple-interaction term by the pre-AGOA U.S. tariff rates. Estimates in Tables 2, 3 and 4 measured the import growth resulting from the elimination of tariff rates, a 100% reduction. The estimates in Table 5 can be used to predict import responses to smaller reductions in tariff levels as well. We find that every percentage point reduction in tariff rates is associated with 3.6% higher imports of apparel, 0.9% higher imports for GSP-Agricultural products, and 0.8% higher imports for GSP-Manufactured products. The minerals coefficient is again insignificant, while the petroleum effect inexplicably turns negative. Given that the average pre-AGOA tariff for textiles is 13.1%, 3.7% for GSP-Agricultural products, and 4.4% for GSP-Manufactured products, the effect of the elimination of tariff rates evaluated at the mean comes to a 46.9% increase for apparel, a 3.5% increase for GSP-Agricultural products, and a 3.4% increase for GSP-Manufactured products. These estimates are somewhat lower, especially for manufactured products, than the results of Table 4.<sup>25</sup>

⇒ [Table 5 approximately here] ⇐

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<sup>25</sup> Similar estimates using the logarithm of the tariff rate in the regression, which assumes a constant tariff elasticity, are even closer to the results in Table 4 for agricultural and manufacturing products, but differ more for apparel (results available upon request).

The results for the probability of importing, in column (2), follow roughly the same pattern. Each percentage point decrease in apparel tariffs is estimated to increase the probability of apparel imports by 0.26%. For GSP-Agricultural and Manufactured products, a similar tariff reduction would on average result in a 0.08% and 0.06% increase in the probability of importing these products. The average elasticity at the extensive margin that these responses to absolute reductions in tariffs imply, at the top of Table 5, line up well with the total effect estimated in Table 4 for apparel, but are again lower for GSP-Agricultural and Manufactured products.

One distinct possibility is that the effect of tariff reductions is non-linear. Differential effects by initial tariff levels can be explored by interacting the triple-interaction effect in equation (4) with dummies for different tariff classes. As such, we allow for a different responses by initial rate of protection. For apparel products we use eight tariff classes and for GSP products (pooling all subcategories), which are on average subject to lower tariffs, five.<sup>26</sup>

The point estimates and 95% confidence intervals for all triple-interaction effects are plotted in Figure 1 for apparel, and in Figure 2 for GSP products. For apparel, the estimated coefficients on the two lowest tariff brackets are insignificant. For the other brackets, the estimates exceed 0.18 and are significantly different from zero. Import responses for small or moderate tariff reductions appear small in comparison to the responses in the high-tariff brackets. The effect of a tariff reduction of more than 30% is a 7-fold increase in apparel exports.<sup>27</sup> The GSP coefficients are smaller but the non-linear effect is still clearly present. The point estimate for tariff cuts of more than 30% is more than triple any other estimate, indicating a 55% increase in exports, but the confidence interval is very wide as well, and includes zero. In general, the removal of the highest tariff rates is clearly associated with the largest import responses.

⇒ [Figures 1 and 2 approximately here] ⇐

## 7 Robustness Checks

### *Control group*

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<sup>26</sup>The lowest tariff class dummy for apparel takes the value of one if pre-AGOA tariffs were between 0 and 3% and zero otherwise. Subsequent tariff classes use the following tariff brackets: 3–6%, 6–10%, 10–15%, 15–20%, 20–25%, 25–30%, and higher than 30%. For GSP products, the tariff brackets employed are: 0–5%, 5–10%, 10–20%, 20–30%, and 30% and higher.

<sup>27</sup>The width of the confidence intervals tend to vary inversely with the number of products that fall in each tariff bracket.

All results to this point have used all non-AGOA countries worldwide as the implicit control group for the AGOA effect. Given that the African countries' export composition is likely to differ substantially from more developed countries, we also report results excluding the OECD countries from the control group. These results are in column (2) of Table 6, with the benchmark results repeated in column (1). The estimated impact of AGOA is very similar for the three categories of interest: slightly larger for agriculture, and slightly smaller for apparel and manufactures. Each of the AGOA effects remain positive and highly significant.

$\Rightarrow$  [Table 6 approximately here]  $\Leftarrow$

### *Self selection*

The apparel effect measures the trade response for those countries that become subject to the apparel provision of AGOA. Because this provision needed to be applied for, the experiment is not as clean as that on agricultural or manufactured goods. Countries that could foresee no AGOA-apparel effect could choose not to apply for the apparel provision, leading us to overestimate the average apparel effect across all AGOA countries. An extremely conservative estimate of the lower bound of the AGOA-apparel effect can be obtained by treating all AGOA countries as eligible for the apparel provision beginning at the outset of AGOA in 2001, whether or not they were actually ruled eligible (which can only happen after an application).<sup>28</sup>

The results are in column (3) of Table 6; the AGOA-GSP effects are essentially unchanged. The apparel effect drops from 53% to 23%, but remains statistically significant, and still represents an economically large increase. Interpreted most conservatively, the 53% figure only represents the effect of AGOA on those countries that were subject to the apparel provision. The 23% figure is a lower bound of the average effect of AGOA on apparel imports across all AGOA countries. It assumes that AGOA countries not under the apparel provision actually did have access to this provision, and for the entire AGOA period.

### *Treatment window*

To estimate the impact of AGOA, we faced a trade-off in selecting the post-AGOA period. On the one hand, a shorter window has the benefit of cleaner identification because

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<sup>28</sup>As of January 2, 2007, 27 of the 42 countries ever eligible for AGOA were also eligible for the apparel provision.

fewer other changes can take place. On the other hand, it requires time for firms to fully exploit the newly obtained market access, especially if new trade is created and not merely diverted from elsewhere. In addition, the impending abolishment of the MFA lead many observers to expect any AGOA effect to be short-lived. The timing effects in Table 3 already illustrated that the response on the extensive margin contributes to a growing effect over time.

As a further robustness check, we also estimated each specification in the paper for a shorter treatment window of three years pre and three years post-AGOA, 1998–2003 (full results available upon request). Note that the set of countries qualifying for the Act is somewhat smaller in this period. In column (4) of Table 6 we report the results for the benchmark specification (4), corresponding to the results in column (1). The point estimate remains remarkably similar for apparel. For manufactures, the estimate is still significant, and as expected, somewhat lower. For agriculture, the estimate is now insignificant.

#### *Trade diversion*

To this point, we have tested whether or not AGOA has resulted in a significant increase in imports from eligible countries into the U.S. From a policy perspective, it is important to differentiate whether this increase was the result of new export creation or merely a diversion of exports from elsewhere. The most straightforward approach to answer this question would be to run a similar set of regressions using AGOA country exports to the rest of the world as dependent variable. The U.N. Comtrade database contains all bilateral trade flows, not limited to the U.S. Unfortunately, African countries only report exports sporadically. At most nine AGOA countries would remain in the sample for such an analysis. Moreover, trade statistics tend to be collected less accurately on the export than on the import side, which is likely to introduce measurement error.

Instead, we consider the sum of imports into the U.S. and into the 25 countries of the E.U. as a proxy for total exports, as these are Africa’s main trading partners. Trade diversion is also most likely from export destinations with similar tastes and level of development. We then test whether or not the Act had an effect on the exports from AGOA countries to the E.U., using a regression of the form of equation (4), but with E.U. imports as dependent variable. If AGOA merely resulted in attracting imports to the U.S. that had previously been going to Europe, we should expect negative coefficients on precisely the same variables for which we estimated positive coefficients in the benchmark (U.S.) equation.

Our data set of E.U. imports is comparable to the U.S. data, but limited to the years 1999, 2000, 2002, and 2003. For comparability, we report the U.S. results estimated for

these four years in column (5) of Table 6. The results are generally similar to the nine-year benchmark estimates in Column (1). The apparel estimate is somewhat higher, while the effect on manufactures is smaller, and the agriculture effect is now insignificant. The impact of AGOA on E.U. imports is in column (6). The effects for most product categories are not significantly different from zero.<sup>29</sup> Perhaps surprisingly, where the effect is significant, it is positive. For example, E.U. imports of GSP-Manufactured products, are found to increase by 4%. A potential explanation (among many) could involve spillover effects from the increased U.S. imports. The experience of exporting to the U.S. could make it easier to export to the E.U., for example if infrastructure or logistics costs can be shared across destinations. The results clearly indicate that the large U.S. import responses found earlier are not merely trade diversion from the E.U.

#### *Fewer controls*

The specification with country-product, country-year, and product-year fixed effects, in equation (4), is very general but requires an enormous number of controls. Over the sample period, the U.S. reports imports from 207 different countries and 5120 different products at the 6-digit HS classification. This results in more than one million dummies. To check the robustness of the findings, we limit the number of controls.

The results for the different specifications of Table 7 include various combinations of the fixed effects—the benchmark results are again repeated in the first column. Whenever a fixed effect is removed, say for example the product-year fixed effects, then the product-year double-interaction—the term  $\alpha_5 \text{Ineffect}_t * \text{AGOA\_product}_p$  in (1)—is re-introduced into the equation. Therefore, all estimated effects in Table 7 are still triple-differences. The number of controls goes down in columns further to the right. The final column of this table, which corresponds to the estimation of equation (1), is very restrictive, omitting all fixed effects. To at least control for some country-heterogeneity, we introduce a set of control variables that are generally found to have strong predictive power for trade flows in the gravity equation literature.

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<sup>29</sup>It should be noted that at roughly the same time as AGOA, Europe was implementing its “Everything But Arms” initiative for Least Developed Countries (LDCs). There are 49 LDCs, of which 33 are in sub-Saharan Africa. The portion of this initiative that overlapped with our time period was the removal of some European agricultural tariffs on products from LDC countries (industrial tariffs had by this point already been removed for all LDC imports) in March of 2001. To the extent that these agricultural tariffs overlap with those removed under AGOA, we should measure a reduced effect of AGOA on agricultural products, as well as a positive impact of AGOA on the European agricultural imports. While the GSP-Agriculture coefficient in this regression is not significant in column (6) of Table 6 (although it is positive), it remains possible that the EBA initiative reduces the estimated AGOA effect on agricultural products. It should have no effect, however, on either the GSP-Manufactures or apparel results.

⇒ [Table 7 approximately here] ⇐

The coefficient on the  $Ineffect\_APP_t * APP\_product_p$  double-interaction makes it clear why the difference-in-differences estimate in column (3) of Table 1 overestimates the effects of the AGOA apparel provision. The positive coefficient of 13% ( $\exp(0.126)-1$ ) reveals that there was a general surge in U.S. apparel imports during the AGOA period. The simple difference-in-differences specification cannot control for this and lumps this worldwide surge with the AGOA effect. Similarly, the difference-in-differences specifications in columns (4) and (5) of Table 2 fail to take into account the drops in overall import levels from AGOA countries, as evidenced by the negative  $Ineffect * GSP / APP\_country_c$  double-interaction variables. This leads to incorrect estimates of the AGOA effect.

Even with fewer controls, the significance and relative magnitude of the key triple interaction (apparel and manufactures) variables are preserved across these various specifications. In all specifications but the final column, apparel imports increase by between 40% and 53% as a result of AGOA.<sup>30</sup> The GSP-Manufactures effect lies between 6% and 16%, depending on the specification used, and is always highly significant. The GSP-Agriculture effect becomes insignificant in the more restrictive specifications, suggesting that this effect is less robust.

## 8 Implications

### *Heterogeneous effects*

One might wonder whether the large and robust effects identified earlier apply to all countries or whether they are driven by outliers. We can evaluate the impact of AGOA at a more disaggregate level by estimating the category-specific triple-interaction effects separately for each country. Estimation is as before, but the  $GSP\_country_c$  and  $APP\_country_c$  variables in equation (4) are replaced with the full set of country dummies (for eligible countries). For the three categories of interest—Apparel, GSP-Manufactures, and GSP-Agriculture—the average country-specific estimates are 0.409, 0.128, and 0.082. This lines up quite closely with the results in Table 4 that force the same effect on all AGOA countries; estimates there were 0.426, 0.127, and 0.080. All coefficients are reported in Table A.1 in the Appendix.

The dispersion across countries is substantial for apparel, more moderate for GSP-Agriculture, and even smaller for GSP-Manufactures. For agriculture, 24 of the 26 significant

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<sup>30</sup>The 99% increase in apparel exports predicted by the extremely restrictive specification of the final column does not allow for any heterogeneity across products or countries.

coefficients are positive, suggesting that in almost one third of the AGOA countries, there was an increase in agriculture exports.<sup>31</sup> The average coefficient among these countries was 0.109. For manufactures, all of the significant coefficients are positive, with 35 of the 41 countries show a positive effect of AGOA on GSP-manufactures exports. Within this set, the average coefficient was 0.168, only slightly above the aggregate coefficient of 0.146, suggesting that the impact of AGOA on manufactures was broadly based.

For apparel, the dispersion of the point estimates is much larger. Five of the twenty-six countries show a negative impact, although only two are significant—with an average effect of -0.117 (-11.0%). One is for Côte d’Ivoire, which only joined the apparel provision in 2004 and was forced to leave after one year; the second country is Senegal. The positive estimates are significant in 14 of the 21 cases, and the average is 0.759 (+114%), but the range, even among the significant coefficients, is large, between 0.086 and 2.075.

The correlation between the logarithm of the initial apparel export level and the AGOA effect is large, 0.58, and highly significant. Countries that were already exporting considerable quantities of apparel reaped the largest benefits from the U.S. trade liberalization. This pattern is illustrated in the top graph of Figure 3, showing a positive slope on the predicted regression line for the AGOA coefficient estimate on the initial export level. For the GSP categories, there is no strong relation between initial export volumes and AGOA effects.<sup>32</sup>

⇒ [Figure 3 approximately here] ⇐

The country-specific differences are also not random. When we regress the estimated triple-interaction coefficients on variables that have proven to predict trade well in the gravity equation literature, most signs are intuitive. We include the same variables in the regression as Rose (2004) and add the time and time-squared that a country has enjoyed duty-free access, but omit the English language dummy and the remoteness variable to conserve degrees of freedom.<sup>33</sup> The precision, the inverse of the standard deviation for the coefficient estimates, is used as weight. Results are in Table 8.

⇒ [Table 8 approximately here] ⇐

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<sup>31</sup>The two significantly negative coefficients are for Central African Republic and Eritrea, which were both removed from the program on January 1, 2004 for political reasons outlined earlier.

<sup>32</sup>The regression lines in Figure 3 are estimated weighing countries by the precision of their estimates. The respective t-statistics for apparel, agriculture and manufacturers are 2.78, 1.18, and -0.78. While the South African point estimate for manufacturing is large and negative, it is estimated very imprecisely.

<sup>33</sup>The t-statistics on these variables never exceed 0.5.



Distance to the U.S. is a negative and significant predictor for the agriculture and manufactures effect, and the coefficient on the GDP variable is positive and significant, as expected. The population density, country population divided by area, is negative and significant for both agriculture and manufactures.<sup>34</sup> The effect of time is significant and convex, suggesting that the impact on GSP imports grows more strongly over time. The landlocked dummy is never significant. The gravity variables have been surprisingly effective in predicting trade volumes and here they (along with time) explain more than 60 percent of the country variation in the response to trade liberalization for the GSP products as well. In contrast, none of the coefficients are significant in the apparel regression. This may be partly related to the smaller number of coefficient observations in the regression, but may also reflect that the apparel responses appear well explained by the pre-AGOA levels of apparel exports, as noted earlier

In contrast, there is virtually no relationship between the estimated trade responses and a number of governance indicators. The negative impact of corruption on growth has been studied extensively and is now widely acknowledged. The evidence across countries, e.g. Mauro (1995), has been confirmed by firm-level evidence, e.g. Fisman and Svensson (2006). The two leftmost panels in Figure 4 plot the estimated coefficients for GSP-products (at the top) and for apparel (bottom) against the widely-used World Bank indicator of corruption.<sup>35</sup> The cloud of estimates does not reveal a distinct pattern and the slopes of the two regression lines are insignificant in both panels. While countries with less corruption, positive indicators, have done somewhat better on average, the range of the estimates for countries with widespread corruption is very wide. In particular, two of the countries with the largest apparel effects, Kenya and Madagascar, are also among the most corrupt.

An equally large literature studies the relationship between growth or development and the quality of institutions or the protection of investors' property rights. In particular, a number of authors have investigated the relative importance of institutions versus trade as an engine of growth. While Dollar and Kraay (2003) finds both factors to be important, trade especially in the short run, Rodrik, *et al.* (2004) finds that institutions 'trump' all other effects. Given that countries with better institutions also trade more, see Dollar and Kraay (2003) for evidence, it is interesting to verify in the African case whether countries with better institutions are also better able to take advantage of the U.S. trade liberalization.

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<sup>34</sup>Since population is typically negative in gravity equations (which is equivalent to stating that GDP per capita is positive, controlling for GDP), and land area is typically negative, our priors on the sign of this variable were not as strong.

<sup>35</sup>The governance indicators are available online at <http://www.worldbank.org/wbi/governance/data>. There is no relationship either with other measures capturing economic or political freedom and government effectiveness or regulation.

The rightmost panels in Figure 4 plot the estimated AGOA-effects against the World Bank indicator of “rule of law”. The estimates are all over the place and, similarly as for corruption, neither of the regression lines is significant. Overall, then, although others have demonstrated the ability of less corrupt countries with better institutions to grow faster, here we find that more corrupt or more unruly countries appear equally likely to benefit from improved market access granted to them.

⇒ [Figure 4 approximately here] ⇐

### *Aggregate trade effects*

The analysis thus far has focused on African exports for narrowly defined product categories. We have documented very large percentage changes, but obviously the aggregate importance depends on the initial level of exports for the products affected most. The impact of AGOA is placed in the context of the aggregate export level in Table 9.

The first column indicates total AGOA country exports to the U.S. in the key product categories—apparel, agriculture, and manufactures—averaged over the three years prior to the Act.<sup>36</sup> These exports of selected AGOA products comprised 24% (1304/5472) of non-oil exports to the U.S. prior to the Act.<sup>37</sup> In the following years, the export increase in these three product categories was large, with a 94% or \$1.2b increase overall, as noted in percentage and absolute terms in columns (2a) and (2b). The increase was particularly large for apparel, at 120%. These AGOA products accounted for fully 49% (1225/2517) of the total increase in non-oil exports following the Act, twice as high as their initial share of non-oil exports. As a result, their average share in the 2002/2006 period increased to 32% ((1304+1225)/(5472+2517)).

The observed aggregate increases do not account for worldwide surges in these product categories during the AGOA time period, or for price changes within the product categories,<sup>38</sup> which are among the reasons that we estimated the triple-difference coefficients to measure the AGOA impact. The effects we estimated before, repeated in column (3a), suggest that

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<sup>36</sup>We focus on these categories since the petroleum effect is only significant for petroleum-exporting countries, and insignificant overall. The minerals category, while positive and significant, is limited to a very small number of products, and we hesitate to draw broader conclusions from this.

<sup>37</sup>It is also clear from the table that oil dominates African exports to the U.S. before the Act. We are interested in the changes once oil is netted out, and so the total non-oil exports serve as the denominator for most reported changes.

<sup>38</sup>The import values have been deflated to 2000 \$US using U.S. import price indices available at the U.S. Bureau of Labor Statistics website ([www.bls.gov](http://www.bls.gov)). However, this does not account for the detailed within-product-category price changes that are handled using the triple-differencing.

only a fraction of the observed export increase can be attributed to the Act. Multiplying the percentage changes by the pre-AGOA export levels of the first column provide an estimate of the AGOA-induced increase in exports, reported in absolute terms in column (3b). The absolute export increase attributed to AGOA totals \$439m, most of which is in apparel. It represents 8% of the total initial non-oil export *level* (in column (3c)) and 17.4% of the total export *growth* in the post-AGOA period (in column (3d)).

To place this figure in a slightly wider context, the AGOA-induced increase amounts to approximately 0.15% of the AGOA countries' GDP in 2000. While this number is modest, it is not trivial. Moreover, it is reflective of the modest nature of the program, especially for goods other than apparel. As mentioned previously, the average tariff rate on the GSP products for which the Act abolished tariffs were 4.1% (overall), 3.7% (agricultural goods), and 4.4% (manufactures). The average tariff rates on the goods *not* included in the Act were 3.9% (overall), 10.4% (agriculture), and 2.8% (manufactures). Moreover, current imports of non-oil products not included in the Act are approximately four times larger than the non-oil imports that fall under the Act. It suggests that there remains scope for liberalizing imports from Africa further, particularly in agriculture.<sup>39</sup> Even further unilateral action by the U.S. could multiply the current impact on these countries' GDP.

#### *Other Issues*

General equilibrium considerations imply that good prices will adjust after the trade liberalization. In the U.S., the effect is likely to be minor, as AGOA imports are only a tiny fraction of total U.S. imports. For apparel, the Act explicitly specifies a limit on the AGOA import share in order for products to remain exempt from tariffs and quotas. By the end of 2006, the cap was around 6% and even that proved non-binding. Price effects in the AGOA countries are also likely to be minor for domestic consumers as most export products, especially those that saw tariffs drop significantly, are specialized for export markets. For exporters, on the other hand, a fraction of the AGOA effect we estimate may represent a higher price they fetch for their products as our trade values are CIF, i.e. exclude duties.<sup>40</sup> The quantity response is thus likely to be smaller than the total response we estimate. For African exporters, the extent to which they now receive a higher price for their products (the full world price) the Act represents a pure welfare gain.

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<sup>39</sup> It is worth remembering, as well, that in addition to these tariffs, significant non-tariff barriers remain, for example in the form of production subsidies for agricultural products.

<sup>40</sup> Note that through the product-year fixed effects, we are implicitly controlling for changes in the world price within product categories.

If the better export opportunities led to higher production, we should subtract the opportunity cost of the resources involved to net welfare gains from output gains. Obviously, that analysis is beyond our data, but it is worthwhile to point out that the export response rises disproportionately with the rate of protection—Figures 1 and 2. Production distortions are most likely for the most protected products. Moreover, we found no evidence of trade diversion from Europe, which might be the first expected margin of adjustment for resource use.

An additional benefit of the Act that has been documented by several observers, see for example Lall (2005) and Roberts and Thoburn (2003), is the attraction of foreign direct investment (FDI) to affected sectors, apparel in particular. Anecdotal evidence suggests that new foreign firms that enter these countries brought better technology and organization, boosting domestic performance. It has also led many firms to upgrade capital equipment, raising output further. Even at the aggregate level the increased FDI is apparent. Statistics in Table 10 compare the level of inward FDI flows prior and post the onset of AGOA, columns (1) and (3). Inflows increased by 77% in the AGOA countries, while the rest of the world saw a drop in FDI following the stockmarket crash of 2000-01 and post 9/11. The increase for other developing countries was to a large extent driven by the accelerating FDI flows to China. In contrast, the average FDI flow into AGOA countries rose from \$7.1b (1999-2000 average) to \$12.5b (2004-2005 average). The bottom line in Table 10 indicates that the acceleration was not limited to oil-producing AGOA members. Inflows also increased relative to the outstanding stock of FDI, a trend that is limited to the AGOA countries.

$\Rightarrow$  [Table 10 approximately here]  $\Leftarrow$

A large literature investigates the potential beneficial effects of FDI inflows: improved productivity, increased capital stock, spillover effects on local firms. These effects are not necessarily limited to the sectors directly affected by the Act. In addition, there is evidence that exporting entails sunk entry costs, see for example Roberts and Tybout (1997). If export opportunities are improved for one set of goods, firms will be more willing to investment in export activities, e.g. transport infrastructure, financial institutions, overseas contacts and distribution. To the extent that these investments can be shared by other products, not directly affected by the Act, the impact will be enhanced. To the extent that other products benefit, we will have underestimated the effect of AGOA as the triple-difference estimate is relative to a country-baseline export performance.

## 9 Conclusion

This paper has evaluated the impact of the African Growth and Opportunity Act (AGOA), enacted unilaterally by the United States at the end of 2000. The approach we have used allows us to control very generally for country-product specific baseline levels of imports and for country-specific and product-specific import trends in the post-AGOA period. As a result, we can be fairly confident that the results we estimate are directly tied to the Act. Our findings highlight the importance of using triple-difference estimation. Results obtained on the same sample using standard difference-in-differences approaches that focus only on AGOA products or only on AGOA countries over- or underestimate the impact.

The import responses to AGOA that we estimate are very large for apparel products: imports increase on average by 53%. While this might overestimate the average effect of the provision across all AGOA countries—as countries could voluntarily opt out of the apparel provision—even including countries never subject to the apparel provision results in a precisely-estimated lower bound for the apparel effect of 23%. The 53% estimate is at the upper range of predictions pre-AGOA, see for example Mattoo *et al.* (2003). The effect on AGOA-GSP products was also significant with AGOA raising U.S. imports by an average of 13% across all AGOA-GSP products, including an 8% increase in GSP-Agriculture, and a larger and more robust 16% increase in GSP-Manufactured products. In addition to larger exports levels, we also estimated that the Act led to more products being exported to the U.S. This effect was particularly large for agricultural and manufactured products that saw the probability of exporting increase by more than half.

The effect has been increasing over time, particularly for the GSP products. Moreover, the effect on apparel exports outlasted the end of the Multi-Fibre Arrangement on January 1, 2005. The years 2005 and 2006, when these African exporters faced increased competition in the U.S. market from China and other Asian countries, were the years with the largest impact on apparel exports. The continuing duty preferences offered to African countries under AGOA could be sufficient to offset any relative competitive advantage of the Asian countries.<sup>41</sup> AGOA had a disproportionate impact for products that enjoyed the largest tariff reductions, particularly for apparel. Moreover, we find no evidence that the increase in AGOA exports is a diversion of exports from Europe, Africa’s other major export destination.

Allowing for differential impacts of AGOA by country, we explored the characteristics of

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<sup>41</sup>Africa’s comparative advantage can result from political actions (such as U.S. ‘safeguard’ actions), as well as a desire to diversify the source of apparel imports, in addition to more traditional forms of cost considerations.

the countries that were associated with the largest export effects from AGOA. For apparel exports, countries that were already significant exporters to the U.S. prior to AGOA were best poised to take advantage of AGOA. In contrast the effect of AGOA on manufactures and agricultural products appears to be well-explained by gravity variables. However, neither the apparel nor the GSP-product increases were correlated in any way with measures of corruption or rule-of-law; countries with widely varying levels of corruption and institutional quality were able to take advantage of the Act.

While exports in the key AGOA product categories (apparel, agriculture, manufactures) increased 94% in the post-AGOA period relative to pre-AGOA, we estimate more conservatively, using the triple-difference method, that the causal impact of AGOA within these product categories was a 34% increase.<sup>42</sup> While AGOA resulted in an 8.0% increase in total non-oil exports from Africa, this translates into a relatively modest impact on African GDP. Of course, the program itself was quite modest, with the exception of the provisions for apparel. The remaining tariffs on agricultural products are on average three times as high as the agricultural tariffs that were removed under the Act.

A further conclusion can be made from this study. In the context of the preferences offered under AGOA, none of the other limitations frequently cited in the African context—poor infrastructure, distorted product and credit markets, high risk, inadequate social capital, and poor public services—proved to be binding constraints to expanding exports under AGOA. While this might seem like a fairly modest statement, the literature summarized in the paper suggests, in the African context, it is not.

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<sup>42</sup>From Table 9, take 439/1304.

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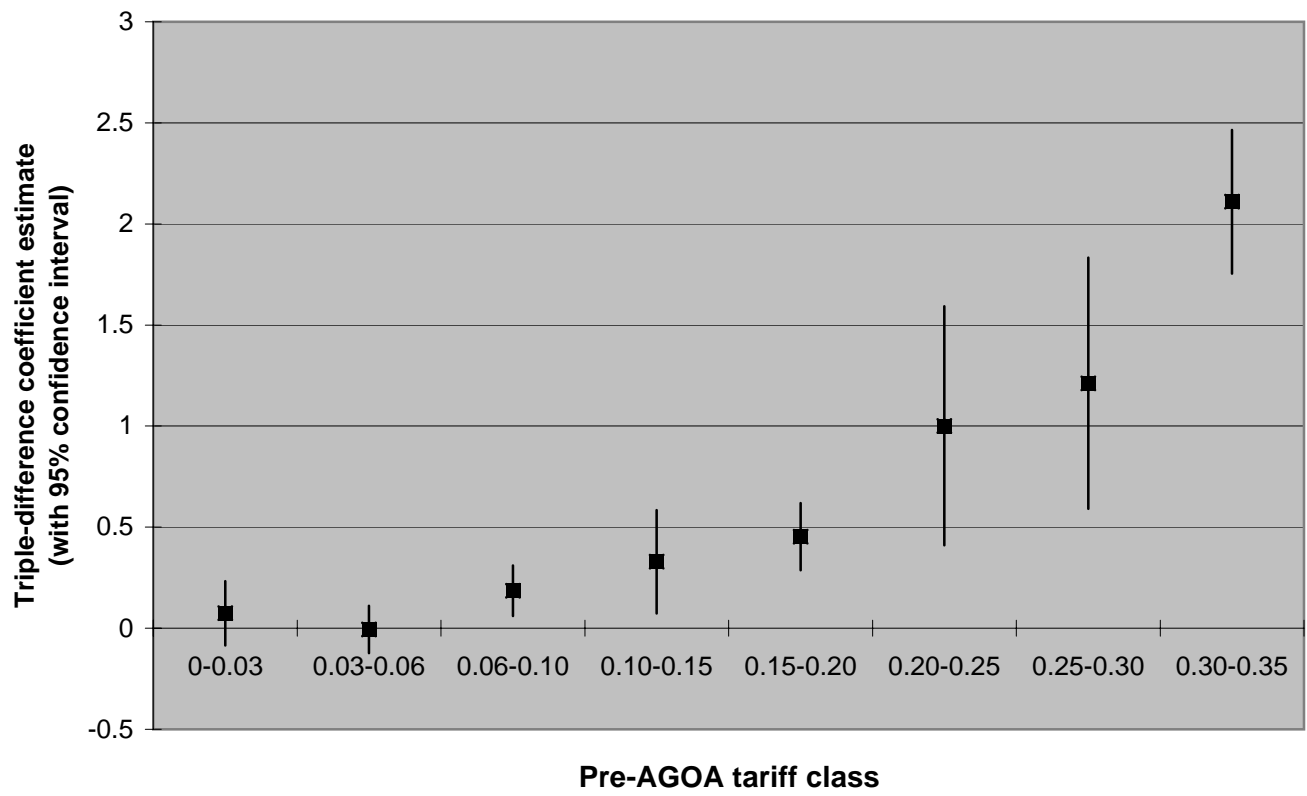
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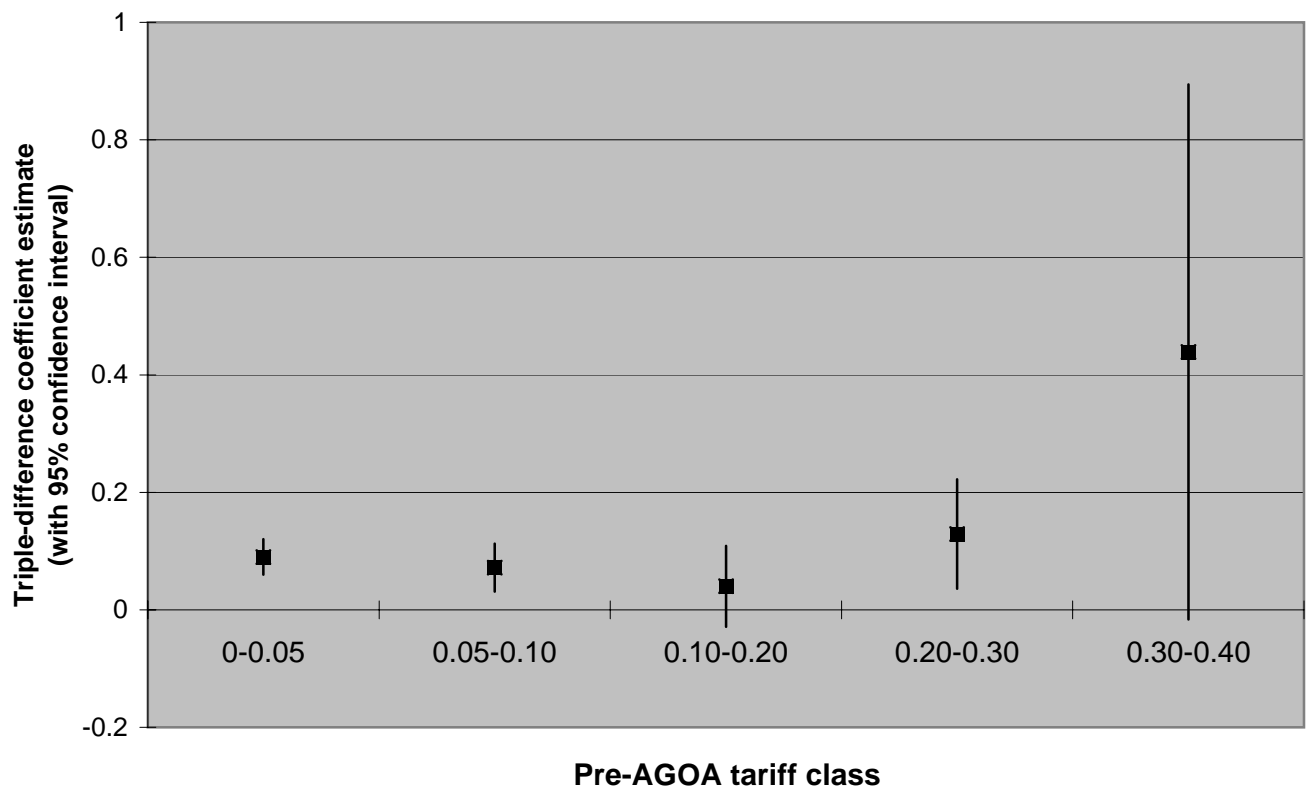


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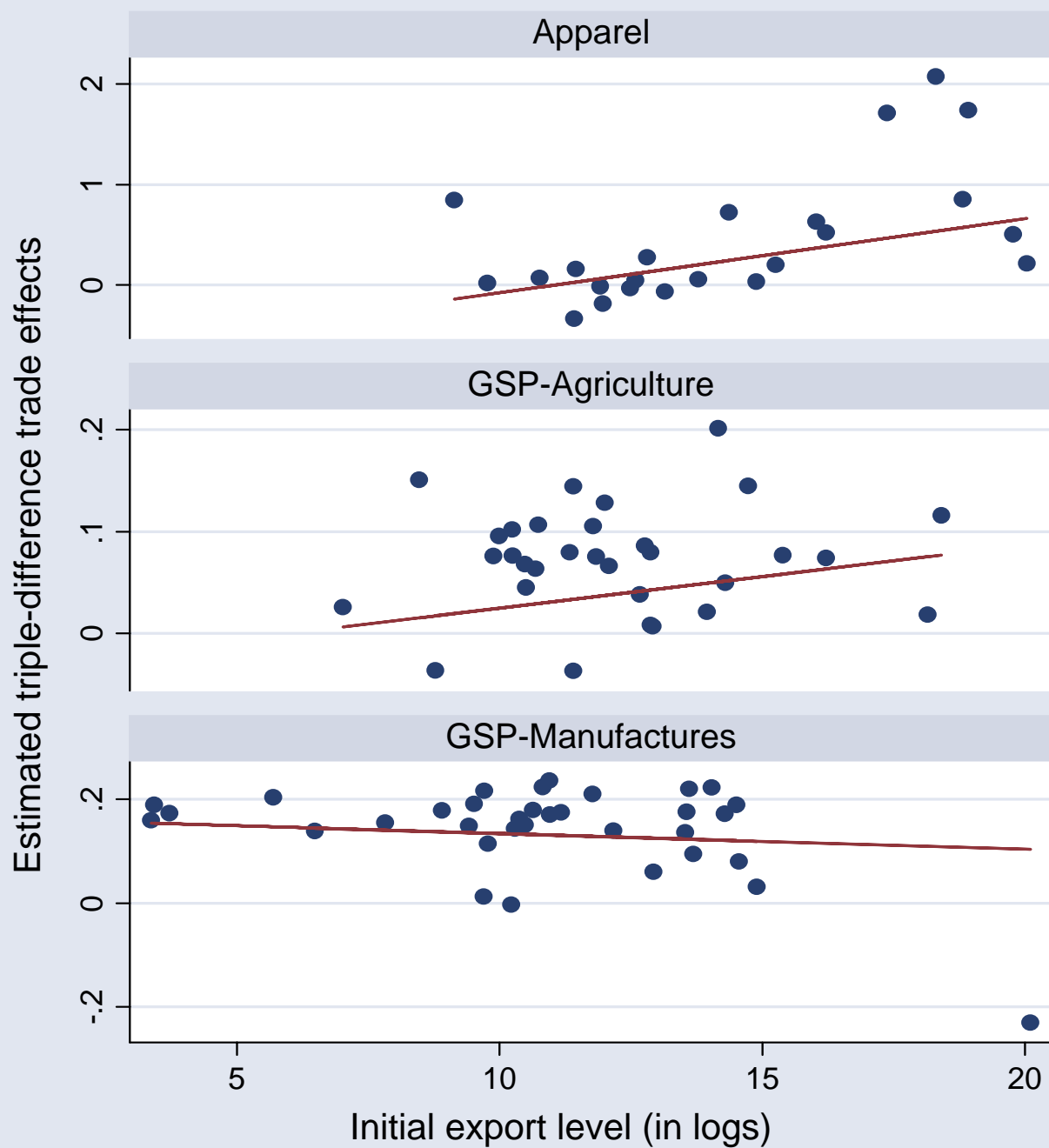
**Figure 1: (log) Import response by pre-AGOA tariff class for apparel products**



**Figure 2: (log) Import response by pre-AGOA tariff class for AGOA-GSP products**



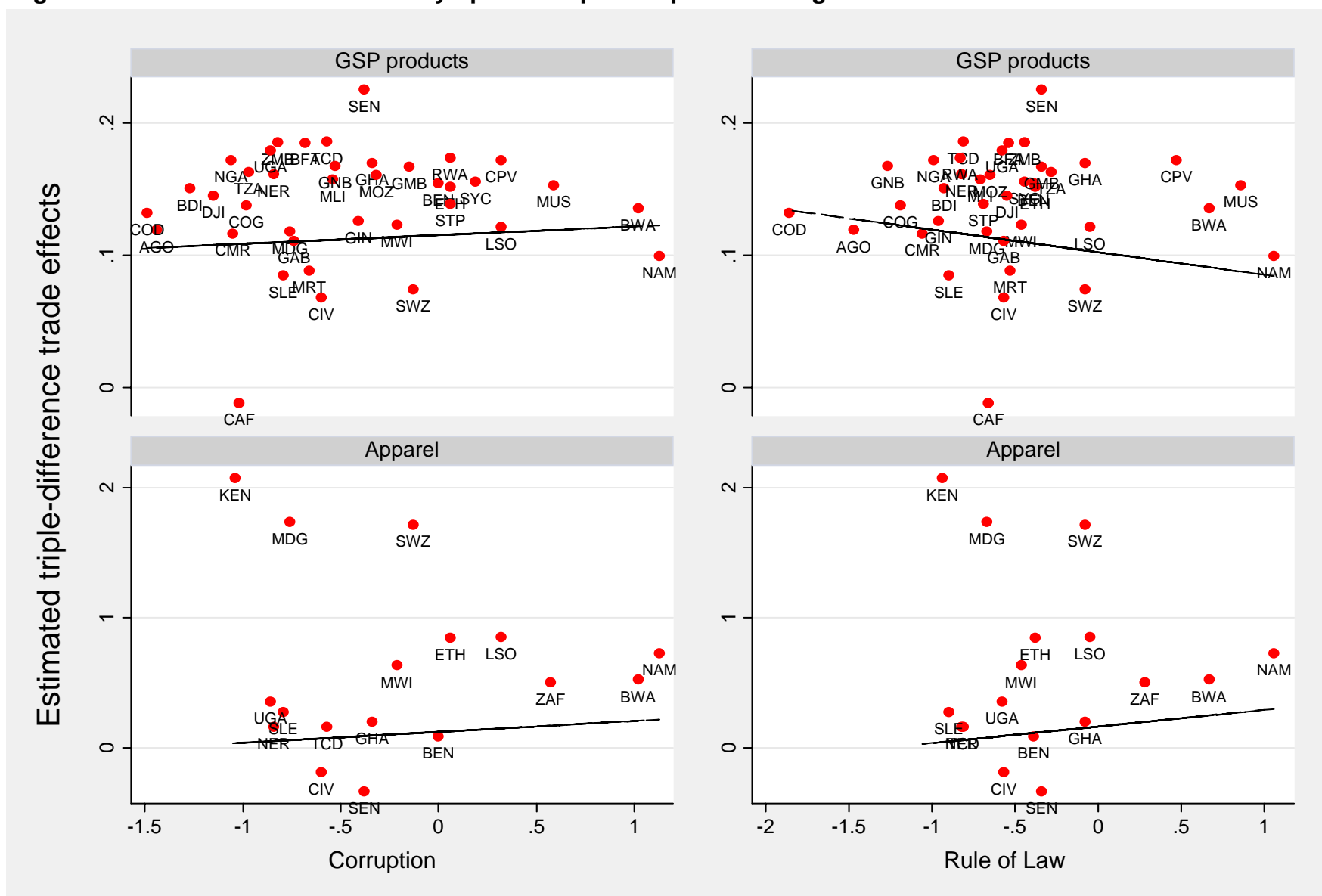
**Figure 3: Country and category-specific AGOA effects and initial export levels**



Graphs by Category

Notes: Each country is one data point. On the vertical axis are the country-specific triple-difference estimates for each of the three product categories. On the horizontal axis is the logarithm of the pre-AGOA export volume (averaged for 1999-2000). The lines represent the predicted values from separate OLS regressions of the estimated AGOA effects on the initial (log) export levels (using the inverse of the standard deviation of each coefficient estimate as weight).

**Figure 4: Correlation between country-specific export responses and governance indicators**



Note: On the vertical axes are the country-specific triple-difference estimates for GSP-products (top panels) and apparel (bottom panels). On the horizontal axes are two of the governance indicators, on a scale of -2.5 to +2.5, taken from the World Bank web site. Only countries with a t-statistic above 1 are plotted. The predicted regression lines are for least squares regressions, weighing all estimates by the inverse of their standard deviation.

**Table 1: Summary statistics (2000)**

<b>Number of products and U.S. import values by country:</b>				
	AGOA countries (41)		non-AGOA countries (166)	
	Mean	Standard deviation	Mean	Standard deviation
All products	5120		5120	
All products (Import>0)	102	(250)	694	(1050)
AGOA-eligible products (Import>0)	28	(57)	174	(222)
log Imports (all)	0.208	(.544)	1.616	(2.627)
log Imports (Import>0)	9.938	(1.029)	10.732	(1.200)

**Limited to AGOA countries:**

By AGOA country:	Number of AGOA products			Initial tariffs on AGOA products	
	All products	Import>0 (mean)	Import>0 (maximum)	Mean (all goods)	Mean (if positive)
Apparel	239	14.37	120	13.1%	13.1%
GSP (all)	862	14.02	232	4.1%	8.2%
GSP - Agricultural	282	3.61	51	3.7%	7.7%
GSP - Mineral	4	0.00	0	1.7%	6.1%
GSP - Petroleum	2	0.44	2	0.4%	1.0%
GSP - Manufacturing	574	9.98	180	4.4%	8.5%

**Table 2: Benchmark results for the AGOA effect**

dependent variable	ln <i>IMP</i>	ln <i>IMP</i>	ln <i>IMP</i>	ln <i>IMP</i>	import dummy
sample	full	only AGOA countries	only AGOA-APP products	only AGOA-GSP products	full
method	triple-diffs (1)	diff-in-diffs (2)	diff-in-diffs (3)	diff-in-diffs (4)	triple-diffs (5)
Marginal Apparel Effect	53.1%	57.1%	38.4%		3.0%
Marginal GSP Effect	13.5%	-2.2%		0.4%	1.0%
<i>APP</i> : Ineffect * Ctry * Prod	0.426 (8.03)**	0.452 (8.09)**	0.325 (6.01)**		0.030 (7.21)**
<i>GSP</i> : Ineffect * Ctry * Prod	0.127 (10.56)**	-0.022 (2.60)**		0.004 (0.31)	0.010 (10.16)**
fixed effects	country/product country/year product/year	country/product country/year	country/product product/year	country/product product/year	country/product country/year product/year
Observations	9538560	1889280	400086	1442988	9538560
Number of fixed effects	1107783	210289	46605	168090	1107783

Notes: Absolute value of t-statistics in parentheses; \* significant at 5%; \*\* significant at 1%. Standard errors are robust to arbitrary heteroskedasticity, and also allow for intragroup correlation within product category.

The marginal effects are calculated as ' $\exp(\beta_1 \text{ or } \delta_1) - 1$ ' if the dependent variable is ln*IMP*.

Controls in columns (1) and (5) include country-year, product-year, and country-product interaction dummies.

Controls in column (2) include country-year and country-product interaction dummies.

Controls in columns (3) and (4) include country-product interaction and year dummies and dummies for free-trade agreements that came into effect during the study period, as well as changes in trade relations (into and out of MFN and into and out of GSP eligibility).

**Table 3: Timing the Impact of AGOA**

dependent variable	ln <i>IMP</i>	import dummy
sample	full	full
method	triple-diffs	triple-diffs
	(1)	(2)
<b>Marginal Apparel Effect</b>		
2002 (t*)	24.6%	1.8%
2003 (t*+1)	51.9%	3.2%
2004 (t*+2)	54.3%	3.0%
2005 (t*+3)	62.4%	3.1%
2006 (t*+4)	57.1%	3.0%
<b>Marginal GSP Effect</b>		
2001 (t*)	6.6%	0.5%
2002 (t*+1)	4.6%	0.4%
2003 (t*+2)	12.2%	0.9%
2004 (t*+3)	15.5%	1.1%
2005 (t*+4)	23.4%	1.7%
2006 (t*+5)	26.9%	1.9%
<b>APP: Ineffect * Country * Product</b>		
2002 (t*)	0.220 (4.71)**	0.018 (4.12)**
2003 (t*+1)	0.418 (7.08)**	0.032 (6.46)**
2004 (t*+2)	0.434 (7.44)**	0.030 (6.35)**
2005 (t*+3)	0.485 (7.19)**	0.031 (5.59)**
2006 (t*+4)	0.452 (7.23)**	0.030 (5.53)**
<b>GSP: Ineffect * Country * Product</b>		
2001 (t*)	0.064 (6.10)**	0.005 (4.83)**
2002 (t*+1)	0.045 (3.04)**	0.004 (3.02)**
2003 (t*+2)	0.115 (7.07)**	0.009 (6.73)**
2004 (t*+3)	0.144 (9.10)**	0.011 (8.42)**
2005 (t*+4)	0.210 (12.40)**	0.017 (12.04)**
2006 (t*+5)	0.238 (13.50)**	0.019 (13.04)**
Observations	9,538,560	9,538,560
Number of fixed effects	1,107,783	1,107,783

Notes: Absolute value of t-statistics in parentheses; \* significant at 5%; \*\* significant at 1%. Standard errors are robust to arbitrary heteroskedasticity, and also allow for intragroup correlation within product category.

Controls include country-product, country-year, and product-year interaction dummies.

The year t\* indicates the onset of the AGOA trade liberalization for the majority of the countries, 2001 for GSP products and 2002 for apparel.



**Table 4: Benchmark results for the AGOA effect - Disaggregated Categories**

dependent variable	ln <i>IMP</i>	import dummy
sample	full	full
method	triple-diffs	triple-diffs
	(1)	(2)
Marginal Apparel Effect	0.531	3.0%
Marginal GSP Effect		
Agriculture	0.083	0.7%
Minerals	0.181	1.5%
Petroleum	1.162	4.0%
Manufactures	0.157	1.2%
Ineffect * Country * Product Interaction		
<i>APP</i>	0.426	0.030
	(8.03)**	(7.21)**
<i>GSP-Agriculture</i>	0.080	0.007
	(4.48)**	(4.29)**
<i>GSP-Minerals:</i>	0.166	0.015
	(2.03)*	(2.50)*
<i>GSP-Petroleum:</i>	0.771	0.040
	(0.93)	(0.99)
<i>GSP-Manufactures:</i>	0.146	0.012
	(10.13)**	(9.52)**
Observations	9,538,560	9,538,560
Number of fixed effects	1,107,783	1,107,783

Notes: Absolute value of t-statistics in parentheses; \* significant at 5%; \*\* significant at 1%. Standard errors are robust to arbitrary heteroskedasticity, and also allow for intragroup correlation within product category.

Controls include country-year, product-year, and country-product interaction dummies.

**Table 5: Response of imports to tariff level changes and implied mean elasticities**

dependent variable sample method	ln <i>IMP</i> full triple-diffs (1)	import dummy full triple-diffs (2)
imp. elast. wrt tariffs (APP)	46.9%	3.3%
imp. elast. wrt tariffs (GSP-Agriculture)	3.5%	0.3%
imp. elast. wrt tariffs (GSP-Minerals)	0.4%	0.1%
imp. elast. wrt tariffs (GSP-Petroleum)	-46.7%	-3.3%
imp. elast. wrt tariffs (GSP-Manufactures)	3.4%	0.3%
Ineffect * Country * Product * Pre-AGOA Tariff Rate		
<i>APP</i>	3.575 (8.33)**	0.255 (7.70)**
<i>GSP-Agriculture</i>	0.948 (2.42)*	0.079 (2.26)*
<i>GSP-Minerals:</i>	0.236 (0.34)	0.059 (0.95)
<i>GSP-Petroleum:</i>	-107.251 (16.84)**	-7.614 (14.72)**
<i>GSP-Manufactures:</i>	0.780 (4.18)**	0.060 (3.65)**
Observations	9,526,005	9,526,005
Number of fixed effects	1,106,388	1,106,388

Notes: Absolute value of t-statistics in parentheses; \* significant at 5%; \*\* significant at 1%. Standard errors are robust to arbitrary heteroskedasticity, and also allow for intragroup correlation within product category.

Controls include country-year, product-year, and country-product interaction dummies.

The "implied elasticities with respect to the tariff reduction" at the top of the table are evaluated at the mean of the pre-AGOA tariff level for each category.

**Table 6: Robustness checks I: control-group, self-selection, treatment window, and trade diversion**

dependent variable sample	ln <i>IMP</i> 1998-2006 (1) benchmark	ln <i>IMP</i> 1998-2006 (2) control group	ln <i>IMP</i> 1998-2006 (3) self-selection	ln <i>IMP</i> 1998-2003 (4) window	ln (US <i>IMP</i> ) 1999-2000 and 2002-2003 (5) benchmark	ln (EU <i>IMP</i> ) (6) trade-diversion
Marginal Apparel Effect	53.1%	49.9%	22.5%	53.6%	58.4%	2.2%
Marginal GSP-Agriculture Effect	8.3%	9.1%	8.4%	2.7%	-0.4%	4.0%
Marginal GSP-Manufactures Effect	15.7%	13.1%	15.7%	11.1%	6.4%	4.1%
Ineffect * Country * Product Interaction						
<i>APP</i>	0.426 (8.03)**	0.405 (7.72)**	0.203 (6.13)**	0.429 (7.52)**	0.460 (7.35)**	0.022 (0.58)
<i>GSP-Agriculture</i>	0.080 (4.48)**	0.087 (5.36)**	0.081 (4.50)**	0.027 (1.52)	-0.004 (0.21)	0.039 (1.53)
<i>GSP-Minerals:</i>	0.166 (2.03)*	0.207 (2.40)*	0.166 (2.03)*	0.183 (2.99)**	0.094 (1.32)	-0.072 (0.28)
<i>GSP-Petroleum:</i>	0.771 (0.93)	0.254 (0.46)	0.771 (0.93)	0.601 (0.98)	0.903 (1.02)	1.498 (2.31)*
<i>GSP-Manufactures:</i>	0.146 (10.13)**	0.123 (11.32)**	0.146 (10.16)**	0.105 (7.58)**	0.062 (4.38)**	0.040 (2.07)*
Observations	9,538,560	8,432,640	9,538,560	6,359,040	3,706,880	3,706,880
Number of fixed effects	1,107,783	979,344	1,107,783	1,091,802	947,924	947,924

Notes: Absolute value of t-statistics in parentheses; \* significant at 5%; \*\* significant at 1%. Standard errors are robust to arbitrary heteroskedasticity, and also allow for intragroup correlation within product category.

Controls in all columns include country-product, country-year, and product-year interaction dummies.

Column (2) does not include observations from OECD countries.

In column (3) all AGOA countries are considered as 'treated' by the apparel provision, whether or not it was granted to them. That is, as soon as a country is declared eligible for AGOA (for most countries at the outset of 2001), it is also considered to be 'treated' under the apparel provision.

Column (4) limits the sample to 3 years pre and 3 years post AGOA.

Columns (5) and (6) use data for the years 1999, 2000, 2002 and 2003. (We only have data available for the European Union countries for those years.) Column (5) is for the same specification as in column (1); in column (6) the dependent variable is log E.U. imports.

**Table 7: Robustness checks II: estimation with fewer controls**

dependent variable	ln <i>IMP</i> (1)	ln <i>IMP</i> (2)	ln <i>IMP</i> (3)	ln <i>IMP</i> (4)
Marginal Apparel Effect	53.1%	39.8%	40.8%	98.8%
Marginal GSP-Agriculture Effect	8.3%	-0.6%	-0.6%	-1.3%
Marginal GSP-Manufactures Effect	15.7%	7.0%	5.8%	6.0%
Ineffect * Country * Product Interaction				
<i>APP</i>	0.426 (8.03)**	0.335 (6.24)**	0.342 (6.52)**	0.687 (7.82)**
<i>GSP-Agriculture</i>	0.080 (4.48)**	-0.006 (0.32)	-0.006 (0.35)	-0.013 (0.65)
<i>GSP-Minerals:</i>	0.166 (2.03)*	0.091 (1.16)	0.088 (1.22)	0.052 (0.89)
<i>GSP-Petroleum:</i>	0.771 (0.93)	0.994 (0.92)	0.575 (0.79)	0.564 (0.53)
<i>GSP-Manufactures:</i>	0.146 (10.13)**	0.068 (4.32)**	0.056 (4.08)**	0.058 (3.58)**
Ineffect * Country Interaction				
<i>APP</i>		-0.003 (0.78)		0.204 (34.28)**
<i>GSP</i>		-0.037 (7.58)**		-0.011 (1.92)
Ineffect * Product Interaction				
<i>APP</i>			0.126 (3.83)**	0.249 (6.37)**
<i>GSP-Agriculture:</i>			-0.004 (0.18)	-0.018 (0.71)
<i>GSP-Minerals:</i>			-0.049 (1.23)	-0.077 (1.62)
<i>GSP-Petroleum:</i>			-2.750 (1.21)	-3.093 (1.19)
<i>GSP-Manufactures:</i>			-0.080 (4.89)**	-0.104 (5.04)**
Country * Product Interaction				
<i>APP</i>				-1.449 (14.51)**
<i>GSP-Agriculture:</i>				1.096 (17.83)**
<i>GSP-Minerals:</i>				1.532 (26.46)**
<i>GSP-Petroleum:</i>				-0.310 (0.27)
<i>GSP-Manufactures:</i>				0.167 (2.75)**
Country Dummy				
<i>APP</i>				0.109 (11.07)**
<i>GSP</i>				-1.082 (53.14)**
Product Dummy				
<i>APP</i>				1.892 (13.20)**
<i>GSP-Agriculture:</i>				-1.153 (17.56)**
<i>GSP-Minerals:</i>				-1.644 (31.50)**
<i>GSP-Petroleum:</i>				4.769 (3.02)**
<i>GSP-Manufactures:</i>				-0.162 (2.39)*
fixed effects				
	country/product country/year product/year	country/product product/year	country/product country/year	year
Observations	9,538,560	8,570,880	9,538,560	5,923,840

Notes: Absolute value of t-statistics in parentheses; \* significant at 5%; \*\* significant at 1%. Standard errors are robust to arbitrary heteroskedasticity, and also allow for intragroup correlation within product category. All results are for triple-difference effects estimated on the full sample.

Controls in column (1) include country-product, country-year, and product-year interaction dummies.

Controls in column (2) include country-product and product-year interaction dummies and dummies for free-trade agreements that came into effect during the study period, as well as changes in trade relations (into and out of MFN and into and out of GSP eligibility).

Controls in column (3) include country-product and country-year interaction dummies.

Controls in column (4) include year dummies, dummies for free-trade agreements that came into effect during the study period, as well as changes in trade relations (into and out of MFN and into and out of GSP eligibility), and gravity variables (landlocked, English-speaking, GDP, population, distance to the USA, and land area).

**Table 8: Gravity equation variables predict effects for GSP-products well**

	dependent variable: triple-interaction coefficient estimate		
	Apparel	GSP-Agriculture	GSP-Manufactures
Distance to U.S.	0.398 (0.357)	-0.099*** (0.032)	-0.084** (0.031)
ln GDP	-0.049 (0.083)	0.018** (0.007)	0.019** (0.007)
Population density	0.077 (0.789)	-0.210** (0.085)	-0.174** (0.084)
Landlocked dummy	-0.084 (0.136)	-0.005 (0.015)	-0.001 (0.015)
Time in AGOA	0.093 (0.100)	0.054*** (0.010)	0.057*** (0.011)
(Time in AGOA) <sup>2</sup>	0.044 (0.037)	0.018*** (0.004)	0.014*** (0.004)
Constant	-2.463 (3.698)	0.732** (0.326)	0.624** (0.302)
observations	26	41	41
R <sup>2</sup>	0.198	0.663	0.633

Notes: OLS regression of country and product-category specific triple-interaction coefficients (estimated as in Table 2) on gravity-model variables. The inverse of the standard deviations of the coefficient estimates are used as weights. \* Significant at the 10% level, \*\* 5%, \*\*\* 1%.

**Table 9: Estimated AGOA impact and actual increase in exports to the United States**

	Pre-AGOA Exports (1998-2000)	Actual Increase (1998/2000 - 2002/2006)		Estimated AGOA Impact (1998/2000 - 2002/2006)			
	(1)	(2a)	(2b)	(3a)	(3b)	(3c)	(3d)
	million USD	as % of pre-AGOA exports	million USD	Estimated coefficient	million USD	as % of total non-oil export level	as % of total non-oil export growth
Apparel	656	120.4%	789	53.1%	348	6.4%	13.8%
GSP-agricultural	154	54.1%	83	8.3%	13	0.2%	0.5%
GSP-manufactures	495	71.3%	353	15.7%	78	1.4%	3.1%
Total for (selected) AGOA	1,304	93.9%	1,225		439	8.0%	17.4%
Total non-oil exports	5,472		2,517				
Total exports	17,813		17,137				

Notes: Own calculations based on U.S. ITC dataset and coefficient estimates from Table 4. All values are in millions of US dollars.

**Table 10: FDI inflows**

	pre-AGOA (1999-2000)		post-AGOA (2004-05)		change
	million USD	% of FDI stock	million USD	% of FDI stock	USD
World	1254744	23.4%	813516	8.2%	-35.2%
Developing countries	241155	14.8%	290453	11.8%	20.4%
Developing countries w/o China	200590	14.0%	223886	10.3%	11.6%
AGOA countries	7085	6.9%	12518	7.9%	76.7%
AGOA without oil producers	3731	5.6%	7358	7.1%	97.2%

Notes: Own calculations based on Unctad World Investment Report 2006

Latest year available for FDI statistics is 2005

**Table A.1: Country-specific AGOA effects**

	Apparel	GSP (all)	Agriculture	Manufactures	Petroleum	Minerals
Angola		0.119**	0.117**	0.139**	-3.432	0.070
Benin	0.086*	0.154**	0.074	0.204**	-1.949	0.161**
Botswana	0.522**	0.136**	0.080**	0.149**	2.842	0.119*
Burkina Faso		0.185**	0.145**	0.179**	1.941	1.776
Burundi		0.151**	0.150**	0.144**	1.585	0.146
Cameroon	-0.063	0.116**	0.009	0.190**	-3.826	0.060
Cape Verde	0.055	0.172**	0.144**	0.172**	2.844	0.121*
Central African Republic		-0.011	-0.037**	-0.003	0.579	0.050
Chad	0.157**	0.186**	0.092**	0.180**	10.298**	0.131*
Republic of Congo		0.138**	0.107**	0.176**	-4.359	0.147**
Cote d'Ivoire	-0.187*	0.068*	0.050	0.094*	-3.142	0.023
Democratic Republic of Congo		0.132**	0.093**	0.173**	-3.857	0.082
Djibouti		0.145**	0.076**	0.165**	2.850	0.127*
Eritrea		-0.001	-0.036**	0.013	0.583	0.055
Ethiopia	0.845**	0.152**	0.201*	0.115**	2.794	0.071
Gabon		0.111**	0.076**	0.155**	-5.265	0.119*
Gambia		0.167**	0.096**	0.189**	2.755	0.106
Ghana	0.199	0.170**	0.086	0.224**	-4.190	1.050
Guinea		0.126**	0.066*	0.162**	-2.143	0.517
Guinea-Bissau		0.167**	0.101**	0.179**	4.292**	0.140**
Kenya	2.075**	0.037	0.021	0.031	2.741	0.018
Lesotho	0.851**	0.122**	0.059**	0.139**	2.823	0.100
Madagascar	1.737**	0.118**	0.045	0.140**	2.803	0.080
Malawi	0.631**	0.123**	0.018	0.160**	2.842	0.119*
Mali	-0.015	0.158**	0.102**	0.171**	2.876	0.153**
Mauritania		0.088**	0.026	0.121**	-0.290	0.062**
Mauritius	0.214	0.153**	0.007	0.211**	2.804	0.081
Mozambique	0.071	0.161**	0.105**	0.174**	2.862	0.139*
Namibia	0.724**	0.100**	0.038	0.137**	-1.348*	0.106
Niger	0.159*	0.162**	0.064*	0.217**	-1.324	0.138*
Nigeria	0.049	0.172**	0.128**	0.220**	-4.990	0.124*
Rwanda	0.017	0.174**	0.109**	0.191**	2.869	0.147**
Sao Tome and Principe		0.139**	0.111**	0.151**	0.477	0.153**
Senegal	-0.336**	0.225**	0.175**	0.237**	2.883	0.160**
Seychelles		0.156**	0.088**	0.175**	2.862	0.139*
Sierra Leone	0.273**	0.085**	0.068	0.081**	2.680	0.032
South Africa	0.502**	-0.129	0.116	-0.231	-3.608**	-0.076
Swaziland	1.712**	0.074*	0.076	0.061	2.746	0.023
Uganda	0.353**	0.179**	0.151**	0.180**	2.854	0.131*
Tanzania	0.032	0.163**	0.077*	0.191**	2.851	0.128*
Zambia	-0.033	0.185**	0.080	0.223**	2.892	0.169**
<b>average</b>	<b>0.409</b>	<b>0.128</b>	<b>0.082</b>	<b>0.146</b>	<b>0.793</b>	<b>0.176</b>
<b>aggregate estimate</b>	<b>0.426</b>	<b>0.127</b>	<b>0.080</b>	<b>0.146</b>	<b>0.771</b>	<b>0.166</b>

Notes: The statistics are triple-difference coefficient estimates of individual country effects in a regression like (4). \*\* Indicates significance at the 1% level; \* at the 5% level.