

Trade Growth under the African Growth and Opportunity Act*

Garth Frazer[†]

University of Toronto

Johannes Van Biesebroeck

University of Toronto and NBER

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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 unilaterally and selectively 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 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 the agricultural, and manufactured products treated by AGOA. These import responses grew over the period of AGOA, 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, or at least not from Europe. Implications of these findings are discussed.

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[†]Corresponding author: Rotman School of Management, University of Toronto, 105 St. George Street, Toronto, Ontario M5S 3E6, Canada. E-mail: gfrazer@chass.utoronto.ca. Tel. 416 978 5692. Fax 416 978 5433.

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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.¹ 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 countries, the set of products was not comprehensive. Therefore, since the duty-free access under 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

¹The 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, 2005 include: Zimbabwe, Cote d'Ivoire, Somalia, Liberia, Sudan, Burundi, Central African Republic, Eritrea, Comoros, Equatorial Guinea, Mayotte, Togo.

the exporter's economy.² 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.³ Here again, a product-by-product difference-in-differences estimator would attribute a positive effect to AGOA if the import surge for eligible products 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,"⁴ 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

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

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

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

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 seen as important factors. Therefore, these 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. However, most African countries were well below their apparel quotas for import into the U.S., and so it is not clear that removal of these quotas would matter. Using estimates of Africa's supply response, Mattoo *et al.* (2003)'s conservative predictions were that AGOA would raise Africa's non-oil exports by 8–11 per cent.

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. Section 8 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 and expanded trade preferences. The Canada-U.S. Free Trade Agreement and the North-American Free Trade Agreement have been studied extensively. Trefler (2004), Romalis (2005), Burfisher *et al.* (2001), Clausing (2001), and Head and Ries (1997) have all found that the agreements significantly increased trade among the parties. Frankel *et al.* (1995)

evaluates the welfare implications of the expansion of regional trading blocs in general and finds evidence that some of these blocs have reduced welfare relative to the benchmark of most-favoured-nation (MFN) trade. Greaney (2001) finds that that U.S.-Japan bilateral trade agreements over the period from 1980 to 1995 had little impact on U.S. exports to Japan for the manufactured products targeted in the agreements. 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.

In this paper, 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. As mentioned, the rules of AGOA required that the items for inclusion 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. Perhaps surprisingly, Rose (2004) finds that the effect of the GSP on trade volumes is large, larger even than the 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) study 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) explore 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 find that the African exports would increase considerably, by approximately 14 percent, were such access granted. In contrast, the products added to the GSP list under AGOA had an average tariff rate of only 3.8% and the expected impact is likely to be much smaller.⁵

⁵The tariff rate is measured as an average of the ad valorem tariff rate and the ad valorem equivalent for specific tariffs.

Several other papers suggest that the impact of AGOA could well be very limited. As already noted, Collier and Gunning (1999) do not see developed country tariffs as significant impediments to growth in Africa. Limão and Venables (2001) find 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, poor geography, and domestic (African) trade policy. Wang and Winters (1998), in summarizing a set of World Bank technical papers, find 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.” 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, the liberalization of the foreign exchange market, and significant liberalization on imports, export earnings did not increase. Milner *et al.* (2000) offer 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) 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. 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%. Brenton and Ikezuki (2004) advocate for a renewal of the generous fabric-sourcing rules of AGOA that were set to expire when their paper was written. Their paper was successful in that these rules were renewed. They also discuss the general rules of AGOA, as well as some summary statistics related to the Act.

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, 2005, six more countries had been added to the list, and three countries had been removed. The newer countries, such as Sierra Leone, have generally been admitted after government stability was achieved. Three countries, Eritrea, Côte d’Ivoire, and the Central African Republic, have been removed from AGOA as a result of failures regarding political or democratic freedoms.⁶ All of these removals happen after the time period of our dataset, and therefore no country leaves AGOA during our study period.⁷

The Act allows for duty-free imports under two broad categories: apparel and non-apparel. For non-apparel, roughly 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.⁸

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 on October 2, 2000. 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) used comes either from the U.S. or an AGOA country. While the country-level quotas have been removed, a regional (AGOA) quota remains on the total size of these apparel imports that was initially set at 1.5% of U.S.

⁶Central African Republic was removed after a coup. Eritrea was removed after failing to implement elections and democratic reforms. Côte d’Ivoire was removed after failing to implement a peace plan.

⁷In virtually all specifications, we will use country-product and country-year fixed-effects to control for country-specific effects.

⁸For 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 relevant point estimates on the AGOA effect by approximately one quarter.

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. 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.⁹ As of January 2, 2005, the only country of the twenty-four eligible for the apparel provision that did not qualify for the ‘special rule’ (either by rule or exception granted) was South Africa.

We will test 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 very wide class of models indeed.

4 Empirical specification

The simplest (but most restrictive) triple-difference regression specification is the following:

$$\begin{aligned}
 \ln IMP_{cpt} = & (\alpha_1 + \beta_1 Ineffect_t) * AGOA_country_c * AGOA_product_p + & (1) \\
 & (\alpha_2 + \alpha_3 Ineffect_t) * AGOA_country_c + \\
 & (\alpha_4 + \alpha_5 Ineffect_t) * AGOA_product_p + \\
 & \alpha_6 Ineffect_t + \varepsilon_{cpt}
 \end{aligned}$$

⁹Officially, the rule is defined as having a per capita GNP below \$1500 in 1998 as measured by the World Bank.

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 $AGOA_country_c$ is a time-invariant dummy that takes a value of one if a country is ever declared AGOA-eligible. Similarly, the variable $AGOA_prod_p$ is a time-invariant dummy that takes a value of one for products eligible for duty-free import under 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:

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

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, $AGOA_prod_p$ 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 incredibly restrictive. It does not allow for any country or product-level heterogeneity in the base-level of imports into the U.S, but rather restricts all AGOA products to a single base level of imports, and all AGOA countries to a single base level of imports. In addition, it assumes that the surge in US imports from AGOA countries post-AGOA was the same for all AGOA countries. It also assumes that the surge in US imports in AGOA products post-AGOA was the same for all AGOA products. We prefer to relax these restrictive assumptions. Therefore, our preferred, less restrictive, specification (which allows for the aforementioned assumptions, but does not force them on the data) is:

$$\begin{aligned} \ln IMP_{cpt} = & \beta_1 Ineffect_t * AGOA_country_c * AGOA_prod_p + & (3) \\ & +country/ year_{ct} + product/ year_{pt} \\ & +country/ prod_{cp} + \varepsilon_{cpt} \end{aligned}$$

In this specification, the only coefficient estimated (aside from the values of the fixed effects) is the one of interest, namely that on the triple interaction ($AGOA_country * AGOA_product * Ineffect$). The double-interaction terms of (1) are replaced with interactive fixed-effects, which allow for much greater heterogeneity in i) the base level of imports of a specific product from a specific country ($country/ prod_{cp}$), ii) the overall imports from a given country into the U.S. in a given year ($country/ year_{ct}$), and ii) 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 single-difference ($AGOA_product_p$, $AGOA_country_c$, and $Ineffect_t$) terms as well as the double-interaction terms in the (1) specification.¹⁰ For comparison purposes, we also report results for more restrictive speci-

¹⁰In our notation, variables are preceded by a coefficient (in Greek letters), while entries not preceded by coefficients indicate sets of dummies.

cations, including that of (1) in the robustness checks of Section 7.

A further issue complicates 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.¹¹ Therefore, two sets of the variables in (3) are included in the full specification: one for AGOA-GSP products¹² (GSP) and one for apparel products (APP).¹³ 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 (as discussed below).

The full specification for the benchmark estimation is given by

$$\begin{aligned} \ln IMP_{cpt} = & \beta_1 Ineffect_GSP_{ct} * GSP_ctry_c * GSP_prod_p + & (4) \\ & \delta_1 Ineffect_APP_{ct} * APP_ctry_c * APP_prod_p + \\ & + country/year_{ct} + product/year_{pt} \\ & + country/prod_{cp} + year_t + \varepsilon_{cpt} \end{aligned}$$

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

¹¹A further reason for a differential effect for apparel products under AGOA would have been the fact AGOA also removed any quotas that applied to apparel products pre-AGOA. However, only two countries, Kenya and Mauritius were subject to quota restrictions prior to AGOA, while the removal of duties affected all AGOA countries.

¹²Hereafter referred to simply as GSP products

¹³In the empirical implementation, we will be even less restrictive than this, allowing for different effects across different subcategories of the AGOA-GSP products. For simplicity, that discussion is postponed until Section 6.

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, six more countries were admitted more recently.¹⁴

The coefficients of interest are β_1 and δ_1 . β_1 estimates the impact of non-apparel access under AGOA and δ_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, β_1 measures the surge in imports for GSP products coming from AGOA eligible countries when the Act was in effect. This is measured relative to: (i) overall import surges from AGOA countries during the AGOA period, captured by the country-year fixed effects; (ii) worldwide import surges for GSP products during the AGOA period, captured by the product-year fixed effects; and (iii) the base level of imports pre-AGO, captured by country-product fixed-effects.¹⁵

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 might lead countries to start exporting a wider range of products to the U.S. Especially in the case of apparel, the removal of quotas might have an important effect. Exporting is generally thought to require fixed setup costs; see for example Roberts and Tybout (1997). If expansion options are limited because of quotas, many firms (countries) might not bother to enter the market at all.

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—

¹⁴The 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.

¹⁵In the more restrictive specification (??), this effect is captured by the α_1 coefficient.

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, using a dummy variable that takes the value of one if the country-product-time observation has positive imports into the U.S. and zero otherwise as dependent variable, to isolate the extensive margin response of the export decision. 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 expected 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 product for each country will allow us to recover the response of exports to changes in tariff rates. Multiplying with the logarithm of the tariff rate gives the export elasticity to percentage changes in tariffs. The β_1 and γ_1 coefficients will measure the percentage import response to absolute or percentage changes in tariffs, instead of the 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.N. COMTRADE database. The dependent variable for most of the analysis is the 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 2003. If nothing is reported,

imports are set to zero.¹⁶ 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.¹⁷ 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.¹⁸

The trade data from the COMTRADE database is provided at the HS 6-digit level, while the non-apparel product codes of the AGOA-GSP list are at the 8-digit level. To capture this fact, the GSP_prod_p variable is not a 0-1 dummy variable, but varies continuously between 0 and 1. It is constructed to represent for each 6-digit product the fraction of underlying 8-digit products that are eligible for duty-free imports. In the aggregation, 8-digit products are weighted by the total (worldwide) value of U.S. imports for the 8-digit subcategories in the pre-AGOA period. In contrast, the APP_prod_p variable is always a 0-1 dummy, as the products that fall under the apparel provision are defined at an aggregation level of 2, 4 or 6-digits, depending on the product.

The data on tariffs is taken from Feenstra, Romalis, and Schott (2002).¹⁹ The tariff rates are set at the 8-digit level. As in the case of the import data, we average the tariff rates up to the 6-digit level, weighting the 8-digit tariff rates, by their value contribution to worldwide U.S. imports. As mentioned previously, the tariff rate is measured either as the ad valorem tariff rate or the ad valorem equivalent for specific tariffs.

In the robustness checks (discussed below), we estimate the equations without the large set of fixed-effects. To control for some heterogeneity by country, we use a number of standard 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. Total GDP and per capita GDP are measured using the purchasing

¹⁶To create the dependent variable, we follow the usual practice of adding one unit (dollar) to all import values before taking logarithms.

¹⁷These lists are available on the U.S. Trade Representative web site at <http://www.ustr.gov>.

¹⁸The list is available on the ITA-sponsored web site: <http://www.agoa.gov>.

¹⁹Considerable thanks are due to these authors for making this data available at <http://www.nber.org/data>.

power parity method, and taken from the Penn World Tables, version 6.1. Other country-level variables—the size of the country and dummies for being landlocked and whether English is an official language—are taken from the World Development Indicators 2004 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 6-digit HS products, from 1998 to 2003 are in column (1) of Table 1. The coefficient δ_1 on the $Ineffect_APP_{ct} * APP_ctry_c * APP_prod_p$ triple-interaction term measures the effect of the apparel provision on imports into the U.S., and the coefficient β_1 on $Ineffect_GSP_{ct} * GSP_ctry_c * GSP_prod_p$ measures the effect of the non-apparel concessions under AGOA. While both are positive and significant, the effect of the apparel provision is considerably larger, with the point estimate suggesting that AGOA has increased apparel exports by 51% ($e^{0.411} - 1$). The impact on non-apparel items is to increase exports by an average of 8%.

⇒ [Table 1 approximately here] ⇐

We estimate the equation with almost 6.4 million observations, but include 1.2 million dummy variables. 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 apparel provision in AGOA is associated with a 59% increase in imports into the U.S.²⁰ For GSP products, AGOA results in a 14% increase in these product categories.

In comparison, the difference-in-differences (as opposed to triple-difference) 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

²⁰Note that including the product/year interactive dummies also allows for arbitrary changes in relative prices across goods, and therefore captures the impact on import volumes.

also included to allow for the differential timing of AGOA across countries, although the results are identical if double-interaction variables replace the country/year fixed effects. The apparel effect is overestimated at 77% instead of 59%, and the AGOA-GSP effect is underestimated at 2.7%.

The difference-in-differences method can also focus on the difference between AGOA and non-AGOA countries by restricting the sample to AGOA treated products. We examine GSP products separately from apparel in order to focus on the AGOA/non-AGOA country differences. This way, we use the treated products in untreated countries as control group.²¹ The full set of country-product fixed-effects continue to be included. In column (3), the apparel effect becomes -0.012, and insignificant, and in column (4), the AGOA-GSP effect becomes -0.227 and highly significant. Both of these underestimate the impact of AGOA, for reasons that will be discussed later.

Finally, the last column in Table 1 contains the effects of AGOA on the probability of importing. The probability that a country eligible for the apparel provision under AGOA exports an apparel product to the U.S. is increased by 2.3% after passing of the Act, which is highly significant. In terms of economic magnitude, it should be compared to an average probability of 23.5% for all countries worldwide and 9.4% for AGOA countries prior to the Act, for apparel. The GSP effect is also positive and significant, suggesting that the probability that an AGOA country exports a GSP product to the U.S. is increased by 1.0% after the passing of the Act. This magnitude should be compared to an average probability of 9.8% for all countries worldwide and 4.4% for AGOA countries prior to the Act, for GSP products.

The results of Table 1 measure the average effect of AGOA during the AGOA implementation period. We can examine the timing of the AGOA effect for both apparel and GSP products by interacting the triple interaction with year dummies for each of the AGOA years. The results of this estimation are provided in Table 2. Most AGOA countries are eligible

²¹In 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), when using only AGOA products to focus on the cross-country differences, apparel and GSP products can no longer be combined in the analysis. Otherwise, if the apparel variable was chosen as the included dummy, its coefficient would only measure the apparel effect relative to the average effect for GSP products, making the GSP products the ‘control group’.

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 three years 2001, 2002 and 2003. On the other hand, since twelve of the nineteen countries that are declared eligible for the apparel provision over the period of our dataset 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. Therefore, there are only two years of AGOA apparel implementation to consider. For both sets of products, the magnitude of the AGOA impact rises over time, from 39% to 68% for apparel products, and from 6.0% to 21.5% for GSP products. Again, this can be the result of exporting within new product categories or expanding within the existing categories. The second column explores the probability of importing within a given product category. This is also rising over time in both the apparel and GSP product categories, from 1.2 to 2.7% for apparel, and from essentially 0% to 1.6% for GSP products. Therefore, the 5.8% expansion of GSP related exports in the first year of AGOA took place within already existing export lines, statistically speaking, but later the number of product lines exported did increase.

⇒ [Table 2 approximately here] ⇐

To this point, we have assumed that the impact of AGOA treatment is the same across subcategories of GSP products. Now, we will 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 products), petroleum and related products (11), and manufacturing, including chemicals (1203). The rules and timing of the trade liberalization are identical for each sub-category, and therefore allowing heterogeneous AGOA-treatment effects for these subcategories involves replacing both occurrences of the $GSPprod_p$ terms in equation (4) with 4 terms—one for each of the subcategories: agriculture, minerals, petroleum, and manufacturing. Table 3 repeats the specifications of Table 1, allowing for heterogeneous effects. Obviously, the effect on apparel exports does not change, but for the GSP sub-categories, there are considerable differences. Most noticeably, the petroleum effect is insignificant, and this coefficient will be further discussed later. While the coefficient on minerals is the largest GSP coefficient, it should be noted that there are only 4 mineral GSP products, and so the results on this coefficient should not be interpreted too broadly. On the

other hand, the number of agricultural products (617) and manufactured products (1203) are not inconsequential, and we find that each of the agricultural, mineral, and manufactured product category effects is positive and significant. AGOA resulted in a 19.5% increase in GSP-Agricultural products, and a 11.9% increase in GSP-Manufactured products.

⇒ [Table 3 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 2.3% after the passing of AGOA, relative to a baseline percentage for AGOA countries for these products of 3.2% (and 7.4% in this category for all countries) prior to AGOA. That is, the probability of exporting these agricultural products almost doubles for AGOA countries. For minerals, the AGOA-related increase is 4.9%, relative to a baseline of 0 for AGOA countries, and 1.6% for all countries prior to the Act. That is, no AGOA countries were exporting in the GSP-mineral sub-category (only 4 products here) prior to the Act, but following the act, the probability of exporting in these categories went up (to) 4.9% as a result of the Act. For GSP-manufactures, the probability of exporting increased by 0.6% as a result of AGOA, relative to a baseline of 5.0% for AGOA countries prior to the Act (and 11.1% for all countries prior to AGOA).

In sum, we find that the Act increased apparel trade very substantially, while the import responses of agricultural and manufactured products are relatively large as well. The significant effects at the extensive margin suggest that long term effects are likely to be larger still.

Next, we additionally multiply the triple-interaction term by the pre-AGOA U.S. tariff rates. Estimates in Tables 1, 2 and 3 measured the import growth resulting from the elimination of tariff rates, a 100% reduction. The estimates in Table 4 can be used to predict import responses to smaller reductions in tariff levels as well. The level effects in column (1) indicate that every percentage point reduction in tariff rates is associated with 3.4% higher imports of apparel, 2.1% higher imports for GSP-Agricultural products, and 2.2% higher im-

ports for GSP-Manufactured products. The petroleum coefficient is again insignificant, and the GSP-Minerals category is significant, but again of limited interpretability. Given that the average pre-AGOA tariff for textiles is 13.1%, 3.6% for GSP-Agricultural products, and 4.1% for GSP-Manufactured products, the effect of the elimination of tariff rates evaluated at the mean comes to a 44.2% increase for apparel, a 7.5% increase for GSP-Agricultural products, and a 9.0% increase for GSP-Manufactured products. These estimates parallel, not precisely, but at an order of magnitude level, the results of Table 3. Results in column (2) measure the elasticity of imports with respect to percentage reductions in tariffs. The triple interaction is now multiplied by the logarithm of the pre-AGOA tariff rates. For apparel, the elasticity is estimated at 0.194. For GSP-Agricultural tariffs, the estimated elasticity is 0.153, and for GSP-Manufactured products it is also 0.153.

⇒ [Table 4 approximately here] ⇐

The results for the probability of importing follow roughly the same pattern. The effect of absolute tariff reductions on import probabilities is reported in column (3). A 1% decrease in apparel tariffs, evaluated at the mean, would result in a 0.152% increase in the probability of apparel imports. For GSP-Agricultural products, a 1% decrease in tariff levels, evaluated at the mean, would result in a 0.254% increase in the probability of importing these products. For GSP-Manufactured products, the 1% tariff decrease would result in a 0.217% increase in import probability. The tariff elasticities (for import probabilities) are estimated directly in column (4), with the significance and relative magnitudes mirroring the results of column (2). For apparel and GSP-Manufactured products, roughly half of the effect on import probability, as reported in Table 2, is captured by a 100% reduction in tariffs. For GSP-Agricultural products, the impact of tariff elimination on import probabilities exactly mirrors the results of Table 3. For the apparel and GSP-Manufactured products, it is possible that elimination of a tariff has a larger effect than a reduction, for example by reducing administrative cost. Another possibility is that the effects of tariff reductions are nonlinear. A straightforward way of exploring differential effects based on initial tariff rates is to interact the triple-interaction effect in equation (4) with dummies for different tariff classes. For apparel products we use eight tariff classes and for GSP products (pooling all sub-categories), which

are on average subject to lower tariffs, five.²²

We plot the range of triple-interaction effects for apparel in Figure 1 and for GSP products in Figure 2. For apparel, the effects are positive and significant even for relatively moderate levels of initial protection. The estimated coefficients on each of the tariff brackets, even on the lowest brackets, are all above 0.2. Still, 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.²³ The GSP coefficients are slightly smaller, but also non-linear in effect. All of the GSP-tariff categories are significant at the 5% level. The effects of tariff cuts between 5 and 30% are not distinguishable in the data. The point estimate for tariff cuts of more than 30% is a 70% increase in exports, and this estimate is significantly different from the smallest tariff cut, but not the intermediate cuts. In general, for both types of products, the import response to the elimination of protection becomes quite high if initial tariff levels exceeded 30%. It suggests that these protectionist measures were highly effective in keeping out imports. It also suggests that, some non-linearities appear to be present in the relationship between tariff reductions and import responses.

⇒ [Figures 1 and 2 approximately here] ⇐

7 Robustness Checks and Further Variations

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 1 000 000 dummies. To check the robustness of the previous findings, we relax the controls included in the specification. Specifically, the specifications of Table 5 include various combinations of the fixed effects.

²²The 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.

²³The width of the confidence intervals tends to increase with the number of products that fall in each tariff bracket.

Whenever a fixed-effect is removed, say for example the product-year fixed effects, then the product-year double-interaction is re-introduced into the specification. Therefore, all of the specifications of Table 5 are triple-difference specifications. They generally require more restrictive assumptions the further to the right one moves in the table. The coefficient on the $Ineffect_APP_t * APP_prod_p$ double-interaction makes it clear why the difference-in-difference estimate in column (2) of Table 1 overestimates the effects of the AGOA apparel provisions. The coefficient on this double-interaction term reveals that there was a worldwide surge in apparel imports of roughly 20% ($\exp(0.178)-1$) during the AGOA period. The simple difference-in-differences specification is unable to control for this fact and misattributes this worldwide surge as being a result of AGOA. Similarly, the difference-in-differences specification fails to take into account drops in overall import levels from AGOA countries during the AGOA period, as evidenced by the $country*ineffect$ double-interaction variables. Still, the general significance and relative magnitude of the key triple interaction variables is preserved across these various triple-interaction specifications. In all specifications but the final column, apparel imports increase by between 46% and 59% as a result of AGOA.²⁴ The GSP-Agriculture effect is significant and lies between 12% and 19% across the specifications, while the GSP-Manufactures specification lies between 4% and 12%, depending on the specification used. The final column of this table is incredible restrictive, not allowing for any fixed effects in the estimation. Therefore, to at least control for some country-heterogeneity, we augment the equation with a set of control variables that are generally found to have strong predictive power for trade flows in the gravity equation literature.

Therefore, overall, AGOA has resulted in a robust increase in the level of apparel imports, as well as GSP-Agricultural and GSP-manufactured goods. While the effect of AGOA on apparel products does measure the effect for those countries that become subject to the apparel provision of AGOA, this provision did need to be applied for, and therefore the experiment on apparel products is not as clean as that on agricultural or manufactured goods.²⁵ Therefore, an extremely conservative estimate of the lower bound of the AGOA-

²⁴The 98% increase in apparel exports predicted by the extremely restrictive specification of the final column (which includes no fixed effects of any kind) should be treated with some suspicion.

²⁵The major variation across countries in the apparel provision appears to be the timing of the impact. As of January 2, 2005, 24 of the 35 countries eligible for AGOA have become eligible for the apparel provision.

apparel effect can be obtained by treating all countries as eligible for the apparel provision beginning at the outset of AGOA in 2001. The results in this case are provided in column (2) of Table (6). The AGOA-GSP effects are obviously unchanged. The apparel effect drops from 59% to 14%, certainly a noticeably different result. Nevertheless, the result remains statistically significant, and 14% is also an economically significant increase. Interpreted most conservatively, the 59% figure represents the effect of AGOA on those (19) countries that became subject to the apparel provision. Since this required application, and since countries that could foresee no AGOA-apparel effect might not apply for the apparel provision, this could be an overestimate of the average apparel effect across all AGOA countries. On the other hand, the figure 14% should be treated as a minimum such average effect of AGOA on apparel imports.

To this point, we have been able to test whether or not AGOA has resulted in a significant increase in AGOA imports from AGOA countries into the U.S. It would be very helpful from a policy perspective to be able to differentiate whether or not this increase in imports were new imports from the African perspective or whether they were merely a diversion of exports from elsewhere. The most straightforward approach to this question would involve performing a similar set of regressions using worldwide (including African country) reports of their exports. This would allow us to see whether or not the increased African exports to the U.S. were related to a decrease in exports to other countries, most notably European countries, or whether these exports were "new exports". Unfortunately, African countries only sporadically report their exports over this period, and so this is not possible. Instead, we use the sum of imports into the U.S., and imports into the 25 countries of the E.U. as a proxy for total exports. We then test whether or not AGOA had an effect on the exports from AGOA countries to the European Union countries. This involves running a regression of the form of equation (4), except the dependent variable is European Union imports, rather than U.S. imports. If AGOA merely resulted in attracting imports to the U.S. that had previously been going to Europe, then we should expect to see negative coefficients on precisely the same variables for which we estimated positive coefficients in the benchmark (U.S.) results. We compiled a dataset of European Union imports comparable to the U.S. data, however only for the years 1999, 2000, 2002, and 2003. To ensure that

the loss of the years 1998 and 2001 does not affect the results, we estimate the U.S. results for these years four alone in column (3) of Table 6. The results change very little from our benchmark estimates of Column (1). Then, we estimate, using equation (4), the impact of AGOA on European Union imports. Column (4) of Table 6 reports this result. In general, AGOA had no significant effect on imports into the European Union, although surprisingly, if it had any effect, it was a positive effect on the imports of GSP-Manufactured products, increasing then by 4.0%. A potential explanation (among many) for this effect could be spillover effects from the U.S.-AGOA effect where the experience in exporting to the U.S. also makes it easier to export into the E.U.

8 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 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. The results 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, give misleading estimates of the impact of the Act.

The import responses to AGOA we estimate are very large for apparel products: imports increase on average by 59%. While this might overestimate the average effect of the provision across all AGOA countries (including those that were never subject to the provision), even including countries never subject to the apparel provision results in a precisely-estimate lower bound of the apparel effect at 13%. The 59% estimate is at the upper range of predictions pre-AGOA, see for example Mattoo *et al.* (2003). The effect on AGOA-GSP products was equally robust with AGOA effecting an average effect of 14% across all AGOA-GSP products, including a 19% increase in GSP-Agriculture products, and a 12% increase in GSP-Manufactured products. The strong effect on agricultural products is certainly

consistent with the prioritization of agriculture by African countries in the negotiations of the Doha Round of the World Trade Organization, where the large remaining production subsidies, export subsidies and tariffs on agricultural products by the U.S. and Europe are the primary target.

The impact of tariff reductions appears to be non-linear, with larger tariff reductions resulting in disproportionate increases in imports, across both the apparel and GSP categories.

Finally, we tested whether there was an impact on European imports resulting from AGOA, and found no negative impact, and possibly a small positive impact on manufactured products. That is, the evidence suggests that the increase in AGOA exports to the U.S. is not merely a shift in exports from Europe to the U.S.

The largest effect of AGOA was clearly in terms of apparel imports, and this effect must be interpreted in the temporal context in which the preferences were granted. Prior to January 1, 2005, industrialized countries, including the U.S., imposed quotas on apparel imports within the framework of the Multi-Fibre Arrangement (MFA). Under the Agreement on Textiles and Clothing of the World Trade Organization, these quotas were gradually reduced between 1998 and 2005, but the bulk of quota removals (in value terms) was left until January 1, 2005. In addition to the tariff reductions, the apparel impact of AGOA for African countries was to enact the quota removals earlier than January 1, 2005,²⁶ the date at which other developing countries would also be freed from these quotas. If fixed costs of entering the export market are large (and sunk), and if the African countries did not have a comparative advantage in apparel production in comparison to, for example, China or India, we might not expect AGOA to have much of an impact on apparel exports from Africa. The large impact we estimate implies that either (i) the fixed costs to expanding (apparel) exports can be recouped within a couple of years, or (ii) that apparel producers expected Africa to have a continuing comparative advantage in apparel production after the expiration of the MFA, or (iii) that the duty-free access for AGOA apparel products matters in addition to the quota-free access.²⁷ Regardless, it will be very interesting to see whether the ‘head

²⁶The average date for a country to be declared eligible for the apparel provision of AGOA was April 28, 2002.

²⁷It is worth noting that this ‘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 the more

start' on the quota removals has lasting or only transitory effects on Africa's apparel exports.

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 for 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 apparel exports under AGOA. While this might seem like a fairly modest statement, as the literature summarized in the paper suggests, in the African context, it is not.

traditional forms of cost considerations.

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Table 1: Benchmark results for the AGOA effect

dependent variable sample	ln <i>IMP</i> full	ln <i>IMP</i> only AGOA countries	ln <i>IMP</i> only AGOA- APP products	ln <i>IMP</i> only AGOA- GSP products	import dummy full
method	triple-diffs (1)	diff-in-diffs (2)	diff-in-diffs (3)	diff-in-diffs (4)	triple-diffs (5)
Marginal Apparel Effect	0.589	0.772	-0.012	0.000	0.023
Marginal GSP Effect	0.140	0.027	0.000	-0.227	0.010
<i>APP</i> : ineffect*ctry*prod	0.463 (7.66)**	0.572 (8.79)**	-0.012 (0.20)		0.023 (3.80)**
<i>GSP</i> : ineffect*ctry*prod	0.131 (7.20)**	0.027 (1.53)		-0.258 (14.26)**	0.010 (5.26)**
fixed-effects	country/product country/year product/year	country/product country/year	country/product	country/product	country/product country/year product/year
Observations	6359040	1136640	266724	961992	6359040
Number of fixed-effects	1091802	189440	44454	160332	1091802

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 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).

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.

Table 2: Timing the Impact of AGOA

dependent variable sample	ln <i>IMP</i> full	import dummy full
method	triple-diffs (1)	triple-diffs (2)
Marginal Apparel Effect		
Year 1	0.385	0.012
Year 2	0.679	0.027
Marginal GSP Effect		
Year 1	0.060	0.004
Year 2	0.133	0.010
Year 3	0.215	0.016
<i>APP</i>: ineffect*ctry*prod		
Year 1	0.326 (5.53)**	0.012 (2.05)*
Year 2	0.518 (7.71)**	0.027 (4.35)**
<i>GSP</i>: ineffect*ctry*prod		
Year 1	0.058 (3.18)**	0.004 (1.92)
Year 2	0.125 (6.07)**	0.010 (4.79)**
Year 3	0.195 (9.70)**	0.016 (7.64)**
Observations	6359040	6359040
Number of fixed-effects	1091802	1091802

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.

Table 3: 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	0.589	0.023
Marginal GSP Effect		
Agriculture	0.195	0.019
Minerals	0.592	0.049
Petroleum	-0.730	-0.064
Manufactures	0.119	0.006
Ineffect*Country*Product Interaction		
<i>APP</i>	0.463 (7.66)**	0.023 (3.80)**
<i>GSP-Agriculture</i>	0.178 (6.74)**	0.019 (6.82)**
<i>GSP-Minerals:</i>	0.465 (7.30)**	0.048 (9.12)**
<i>GSP-Petroleum:</i>	-1.308 (1.56)	-0.066 (1.77)
<i>GSP-Manufactures:</i>	0.112 (5.00)**	0.006 (2.44)*
Observations	6359040	6359040
Number of fixed-effects	1091802	1091802

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 dummies.

**Each of the coefficients in column (3) comes from a separate regression that includes only the relevant sub-sample of AGOA products. For example, the coefficient in this column for GSP-Agriculture is the coefficient on the 'double-difference' when only GSP-Agriculture products are included. A single column is used for all of these results for brevity.

Table 4: Results for the tariff elasticity of the AGOA effect

dependent variable	ln <i>IMP</i>	ln <i>IMP</i>	import dummy	import dummy
tariffs measured in	levels	logs	levels	logs
	(1)	(2)	(3)	(4)
imp. elast. wrt tariffs (APP)	0.442	0.194	0.020	0.009
imp. elast. wrt tariffs (GSP-Agriculture)	0.075	0.153	0.010	0.020
imp. elast. wrt tariffs (GSP-Minerals)	0.161	0.329	0.020	0.041
imp. elast. wrt tariffs (GSP-Petroleum)	0.112	0.363	0.002	-0.007
imp. elast. wrt tariffs (GSP-Manufactures)	0.090	0.153	0.009	0.020
Ineffect*Country*Product*Pre-AGOATariff Rate				
<i>APP</i>	3.364	0.194	0.152	0.009
	(7.30)**	(7.33)**	(3.71)**	(3.62)**
<i>GSP-Agriculture</i>	2.109	0.153	0.254	0.020
	(4.96)**	(5.90)**	(4.72)**	(6.34)**
<i>GSP-Minerals:</i>	9.864	0.329	1.227	0.041
	(9.20)**	(16.54)**	(8.52)**	(22.34)**
<i>GSP-Petroleum:</i>	31.758	0.363	0.549	-0.007
	(0.71)	(0.68)	(0.07)	(0.09)
<i>GSP-Manufactures:</i>	2.179	0.121	0.217	0.013
	(4.23)**	(5.14)**	(3.82)**	(4.29)**
Observations	6352992	6349950	6352992	6349950
Number of fixed-effects	1090794	1090287	1090794	1090287

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.

In columns (2) and (4) the triple-difference term is multiplied by the logarithm of the pre-AGOA tariff rate instead of the level as in the other columns.

Table 5: Robustness checks for controls: overall effects

dependent variable	ln <i>IMP</i>	ln <i>IMP</i>	ln <i>IMP</i>	ln <i>IMP</i>	ln <i>IMP</i>
estimation method	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Marginal Apparel Effect	0.59	0.51	0.46	0.48	0.98
Marginal GSP-Agriculture Effect	0.19	0.12	0.12	0.12	0.10
Marginal GSP-Manufactures Effect	0.12	0.04	0.06	0.06	0.08
Ineffect*Country*Product Interaction					
<i>APP</i>	0.463 (7.66)**	0.414 (6.79)**	0.378 (6.24)**	0.395 (6.49)**	0.681 (9.10)**
<i>GSP-Agriculture</i>	0.178 (6.74)**	0.115 (4.34)**	0.113 (4.11)**	0.114 (4.18)**	0.093 (4.24)**
<i>GSP-Minerals:</i>	0.465 (7.30)**	0.404 (7.04)**	0.421 (7.17)**	0.422 (7.34)**	0.368 (6.39)**
<i>GSP-Petroleum:</i>	-1.308 (1.56)	-1.219 (1.64)	-1.677 (1.61)	-1.545 (1.62)	-1.554 (1.18)
<i>GSP-Manufactures:</i>	0.112 (5.00)**	0.044 (1.96)*	0.056 (2.41)*	0.055 (2.35)*	0.081 (4.78)**
Ineffect*Country Interaction					
<i>APP</i>			-0.246 (32.70)**	-0.247 (32.85)**	-0.379 (55.53)**
<i>GSP</i>			-0.221 (39.71)**	-0.222 (39.75)**	0.017 (2.76)**
Ineffect*Product Interaction					
<i>APP</i>		0.178 (8.57)**		0.200 (8.55)**	0.315 (11.06)**
<i>GSP-Agriculture:</i>		-0.000 (0.01)		0.001 (0.05)	-0.070 (3.33)**
<i>GSP-Minerals:</i>		-0.130 (4.78)**		-0.148 (4.77)**	-0.302 (5.86)**
<i>GSP-Petroleum:</i>		2.660 (1.52)		2.993 (1.52)	3.117 (1.35)
<i>GSP-Manufactures:</i>		-0.065 (5.95)**		-0.075 (6.03)**	-0.095 (5.76)**
Country*Product Interaction					
<i>APP</i>					-1.160 (13.62)**
<i>GSP-Agriculture:</i>					0.966 (17.94)**
<i>GSP-Minerals:</i>					1.296 (22.81)**
<i>GSP-Petroleum:</i>					0.480 (1.05)
<i>GSP-Manufactures:</i>					0.136 (2.55)*
Country Dummy					
<i>APP</i>					-0.734 (74.83)**
<i>GSP</i>					0.826 (68.42)**
Product Dummy					
<i>APP</i>					1.700 (12.51)**
<i>GSP-Agriculture:</i>					-1.061 (17.29)**
<i>GSP-Minerals:</i>					-1.480 (25.82)**
<i>GSP-Petroleum:</i>					0.727 (0.41)
<i>GSP-Manufactures:</i>					-0.158 (2.49)*
fixed-effects	country/product	country/product	country/product	country/product	
	country/year	country/year			
	product/year		product/year		
Observations	6359040	6359040	5713920	5713920	4147200

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

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

Controls in column (3) 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 (4) include country-product 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 (5) 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 (landlock, English-speaking, GDP, GDP per capita, distance to the USA, and land area).

Table 6: Additional Specifications

dependent variable	ln <i>IMP</i>	ln <i>IMP</i>	ln (US <i>IMP</i>)	ln (EU <i>IMP</i>)	ln (EU+US <i>IMP</i>)
estimation method	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Marginal Apparel Effect	0.59	0.14	0.58	0.02	0.42
Marginal GSP-Agriculture Effect	0.19	0.19	0.21	0.04	0.11
Marginal GSP-Manufactures Effect	0.12	0.12	0.12	0.04	0.02
Ineffect*Country*Product Interaction					
<i>APP</i>	0.463 (7.66)**	0.133 (4.20)**	0.456 (6.55)**	0.022 (0.58)	0.349 (5.50)**
<i>GSP-Agriculture</i>	0.178 (6.74)**	0.176 (6.67)**	0.194 (7.16)**	0.039 (1.53)	0.101 (3.04)**
<i>GSP-Minerals:</i>	0.465 (7.30)**	0.464 (7.26)**	0.421 (5.36)**	-0.072 (0.28)	0.175 (0.60)
<i>GSP-Petroleum:</i>	-1.308 (1.56)	-1.309 (1.56)	-1.610 (1.65)	1.498 (2.31)*	-0.205 (0.78)
<i>GSP-Manufactures:</i>	0.112 (5.00)**	0.110 (4.93)**	0.114 (4.81)**	0.040 (2.07)*	0.022 (0.82)
fixed-effects	country/product country/year product/year	country/product country/year product/year	country/product country/year product/year	country/product country/year product/year	country/product country/year product/year
Observations	6359040	6359040	3706880	3706880	3706880
Number of fixed-effects	1091802	1091802	947924	947924	947924

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.

Columns (3) through (5) use data for the years 1999, 2000, 2002 and 2003. (We only have data available for the European Union countries for those years. Column (3) is the same regression as Column (1), except on the dataset with fewer years.

Column (2) treats all countries 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.

Figure 1: Effect of Pre-AGOA Tariffs on Log(Imports) for AGOA apparel products at different tariff levels (with confidence intervals)

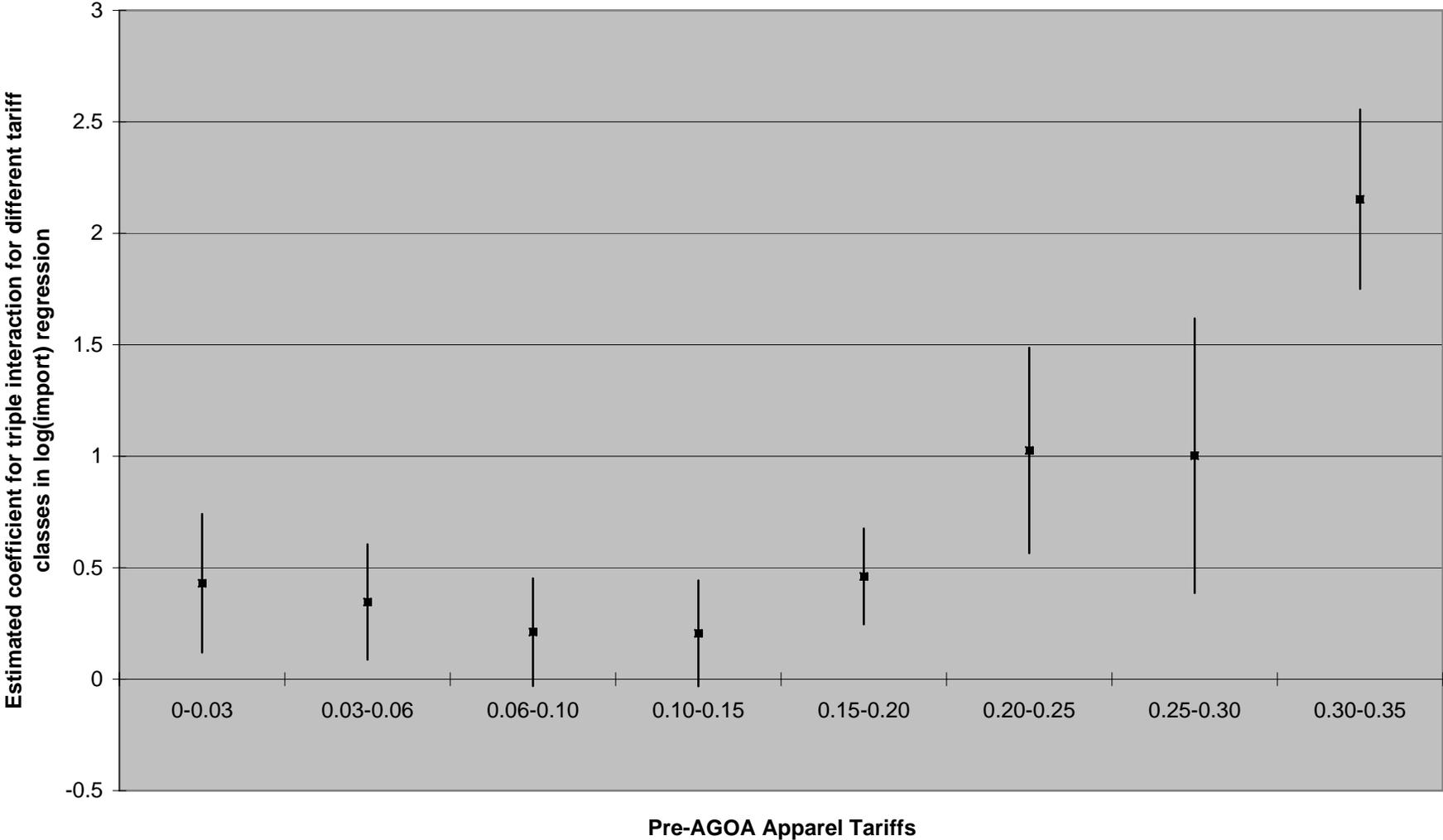


Figure 2: Effect of Pre-AGOA Tariffs on Log(Imports) for AGOA-GSP products at different tariff levels (including confidence intervals)

