Revisiting the Trade Impact of the African Growth and Opportunity Act

A Synthetic Control Approach

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Abstract

This study examines the impact of the African Growth and Opportunity Act using the synthetic control method, a quasi-experimental approach. The novelty in the approach is that it addresses problems of estimation that are prevalent in nonexperimental methods used to analyze the impact of preferential trade agreements. The findings show that most of the eligible countries registered gains in exports due to the African Growth and Opportunity Act. However, the results are varied, and the gains were largely unsteady. Much of the gains are due to exports of petroleum and other minerals, while there are few countries that were able to expand into manufacturing and other industrial goods. The positive trade impacts were largely associated with improvements in information and communications technology infrastructure, integrity in the institutions of legal and property rights, ease of labor market regulations, and sound macroeconomic environment, including stable exchange rates and low inflation. Undue exposure to a single market, like the United States, or few commodities may have also restricted the gains from trade.

Revisiting the Trade Impact of the African Growth and Opportunity Act: A Synthetic Control Approach [*]

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1   Introduction

Since the introduction of the Generalized System of Preferences (GSP) in the 1970s, there has been widespread interest in understanding the impact of non-reciprocal trade preferences provided to developing countries. This is due to robust evidence that the expansion of trade boosts growth and development (Grossman and Helpman, 2015). The economic growth success stories of the recent past, such as China, the Republic of Korea, Singapore and Malaysia, is often attributed to their effective participation in international trade (Spence et al., 2008; Connolly and Yi, 2015). Participation of firms in global trade is effective in spreading the benefits of new technology to improve overall welfare (Segerstrom, 2013). Rise in exports following improved access to foreign markets may lead to the growth of more efficient firms, further inducing increased productivity among firms and across the economy (Melitz, 2003). In addition, increased access to foreign markets, since it induces entry, also yields increases in industry productivity. In line with this evidence, the United Nations Conference on Trade and Development (UNCTAD) has advocated for extension of preferential trade access of least developed countries to advanced economies' markets (UNCTAD, 2012). Subsequently, many PTAs have emerged aimed at providing duty free, quota-free market access for LDCs' exports including the GSP, Everything But Arms (EBA), Caribbean Basin Initiative (CBI), the Andean Trade Preference Act (ATPA) and AGOA.

This study examines the impact of one such preferential trade agreement (PTA), the Africa Growth and Opportunity Act (AGOA) which was extended by the United States (US) to Sub-Sahara African (SSA) countries. The objectives in this study are twofold. First, we evaluate the total trade effect of AGOA using the synthetic control method (SCM): a quasi-experimental approach that addresses limitations in existing empirical approaches to

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examining the impact of PTAs. Second, we explore possible determinants of the variations in the estimated impact across countries, and review the underlying mechanisms driving the variations. In this effort, we attempt to provide an account of the heterogeneous impacts of AGOA in the region. Findings as to why there are heterogeneous impacts of AGOA could inform policy in both the design and structure of PTAs as well as in the design of domestic policy instruments necessary to enhance the capacity of economies to take advantage of PTAs.

AGOA has been considered essential to promoting trade and, hence, transformation of economies in Sub-Saharan Africa (SSA) (US Congress, 2000). The underlying basis for the Act is that "*increased trade ... have the greatest impact ... in which trading partners eliminate barriers to trade and capital flows and encourage the development of a vibrant private sector that offers ... the freedom to expand economic opportunities*" (US Congress, 2000). PTAs, in general, are also considered central to the foreign policy strategy as well as international development objectives of developed economies including the US and the European Union (EU). Trade preferences through AGOA provide quota-free and duty-free imports into the United States for eligible goods expanding the benefits under the GSP program.

After close to five decades of implementation of PTAs, findings on the impact have largely been mixed and scanty (Klasen et al., 2015). In SSA, in particular, empirical evidence has been very limited and scarce. Limitations in empirical approaches used to analyze impact are also evident. The gravity model has been the workhorse framework to analyze the impact of PTAs on trade (e.g. See Anderson and Van Wincoop, 2003; Brenton and Hoppe, 2006; Cipollina and Salvatici, 2010a; Aiello et al., 2010; Gil-Pareja et al., 2014;

Cirera et al., 2016). The predominant empirical literature in the study of the impact of PTAs on trade or exports augments the traditional gravity model with a dummy variable representing participation in a particular PTA. The estimated coefficient of the dummy variable represents a measure of the PTA impact. However, there is ample evidence that participation in PTAs is endogenous (Magee, 2003; Cipollina and Salvatici, 2010a; Egger et al., 2011). Results based on the augmented versions of the gravity model suffer mainly due to the non-experimental nature of the available data. They fail to address underlying country differences due to observed (but not accounted for) and unobserved heterogeneity across countries. Hence, these results might have only provided an imperfect estimation of impact.

Among recent efforts examining the impact of AGOA, Frazer and Van Biesebroeck (2010) employ a triple difference-in-difference (DD) approach to better address these issues. DD estimators provide unbiased *treatment effect* estimates when, in the absence of *treatment*, the average outcome for the *treated* and *control* groups would have followed parallel trends. However, in the absence of proper *control* and *treatment*, trade flows might not have followed parallel trends. Even without AGOA, we expect trade flows to change due to changes in observable and unobservable characteristics of these economies.

We contribute to this literature by using SCM as a quasi-experimental approach to assess the trade impacts of AGOA and address some of these empirical challenges. This supplements and further informs existing work in the study of the impact of PTAs. In addition to identifying the trade impact of AGOA across individual SSA countries, we attempt to explain the heterogeneity of the estimated impact in the second stage of our analysis. This study only focuses on aggregate impact while we present a brief discussion of exports of

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major product groups for countries that registered a relatively larger impact. It also does not account for the possibilities of changes in trade patterns to or from regions other than the US.

The main finding suggests that AGOA has contributed to increased exports in most SSA countries. Impacts however vary over time and across countries; and gains are unsteady. Much of the gains are accounted for by expansion of export of fuel and other minerals while in a few successful cases, countries were able to diversify exports into agricultural produce, beverages and manufacturing commodities. Among the major factors explaining variations in the trade impact of AGOA are physical infrastructure such as ICT; institutions of rule of law and legal frameworks such as property rights protection; conducive macroeconomic environment such as low inflation and exchange rate stability and ease of labor market regulations.

2   African Growth and Opportunity Act (AGOA)

The African Growth and Opportunity Act (AGOA) enacted towards the end of 2000, provides duty-free access to the US market for a selected group of products from eligible Sub-Saharan African countries. The driving principle was to "promote stable and sustainable economic growth and development in Sub-Saharan Africa" through trade. It initially provided eligibility to 34 SSA countries. It has since been renewed and extended to 39 countries, with few changes in the number of eligible countries. In 2015, it was reauthorized for the fifth time for a period of 10 years up to 2025. A full list of eligibility of the two distinct AGOA provisions is presented in Table 1. Most countries, about 31, were declared eligible in October 2000 while few others followed in subsequent years.

There are two key provisions under AGOA. The first provision provides eligible countries duty-free and quota-free access of selected product groups, expanding the list of products under GSP. The GSP is a non-reciprocal trade preference program that permits duty-free imports of products, more than 4,600 at the HS-8-digit classification, from designated developing countries, currently about 130 including most SSA countries. AGOA expands this list to more than 6,400 product groups with an additional 1,800. In addition, AGOA countries are exempt from caps on preferential duty-free imports due to the 'competitive need limitations' (CNL) program. The US limits imports under the GSP program by placing thresholds on the quantity or value of commodities entering duty free.

Table 1: AGOA Eligibility

Country	AGOA Eligible Beginning	Apparel Provision Eligible Beginning	Special Rule for Apparel	Included In Study
Angola	December 2003			✓
Benin	October 2000	January 2004	Yes	
Botswana	October 2000	August 2001	Yes	✓
Burkina Faso	December 2004	August 2006	Yes	✓
Burundi	January 2006			
Cameroon	October 2000	March 2002	Yes	✓
Cabo Verde	October 2000	August 2002	Yes	
Chad	October 2000	April 2006	Yes	
Côte d'Ivoire[1]	Restored			✓
Comoros	June 2008			
Congo, Rep.	October 2000			✓
Congo, Dem. Rep.[2]	Ineligible-January 2011			
Djibouti	October 2000			
Ethiopia	October 2000	August 2001	Yes	✓
Gabon	October 2000		No	
Gambia, The	December 2002	April 2008	Yes	
Ghana	October 2000	March 2002	Yes	✓
Guinea[3]	Restored			
Guinea-Bissau[4]	Ineligible- January 2013			
Kenya	October 2000	January 2001	Yes	✓
Lesotho	October 2000	April 2001	Yes	✓
Liberia	December 2006	January 2011		✓
Malawi	October 2000	August 2001	Yes	✓
Madagascar[5]	June 2014			✓
Mali[6]	Restored-December 2013			✓
Mauritania[7]	October 2000			
Mauritius	October 2000	January 2001	Yes	
Mozambique	October 2000	February 2002	Yes	✓
Namibia	October 2000	December 2001	Yes	✓
Niger[8]	Restored			✓
Nigeria	October 2000	July 14 2004	Yes	✓
Rwanda	October 2000	March 2003	Yes	✓
São Tomé and Príncipe	October 2000			
Senegal	October 2000	April 2002	Yes	
Seychelles	October 2000		No	
Sierra Leone	October 2002	April 5 2004	Yes	
South Africa	October 2000	March 2001	No	✓
South Sudan[9]	Ineligible 2015			
Tanzania	October 2000	February 2002	Yes	✓
Togo	April 2008			
Uganda	October 2000	October 2001	Yes	✓
Zambia	October 2000	December 2001	Yes	✓

Source: United States Government Accountability Office (2015). ✓: countries included in study.)[a]

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[a]Since 2000, 13 countries have lost eligibility out of which 7 have eventually regained their eligibility. Five including Guinea, Guinea-Bissau, Madagascar, Mali and Mauritania lost eligibility following coups. The Democratic Republic of Congo (DRC) was eligible in 2000, ineligible in 2010 and reinstated in 2011. Madagascar was ineligible between 2010 and 2014 due to a political coup. Among the first entries, Cote d'Ivoire was ineligible between 2005 and 2011 due to political unrest and armed conflict.

Despite the broad product coverage, there are still important exclusions particularly in agricultural products. In their examination of the value of AGOA preferences, Brenton and Ikezuki (2004) conclude that a significant number of products remain effectively excluded from AGOA preferences. Important exclusions include certain meat products, dairy products, sugar, chocolate, peanuts, prepared food products and tobacco, which could potentially be major export commodities for many SSA countries.

The second provision provides duty-free and quota-free access for eligible apparel and textiles articles made in qualifying Sub-Saharan African countries for a subset of AGOA-eligible countries subject to a cap. This eliminates the average MFN tariff of about 11.5% on apparel and textile imports to the US. These include products which are not eligible either under the GSP or the first provision of AGOA. Articles include apparel made of US yarns and fabrics, apparel made of SSA yarns and fabrics, textiles and textile articles produced entirely in SSA, certain cashmere and merino sweaters and eligible hand-loomed, handmade and printed fabrics. This represents a significant change in the inclusion of manufacturing products-textile and apparel compared to GSP. With few exceptions such as leather products, headgear, glass and glassware, it provided access to a wide range of textile and apparel products.

Under the 'Special Rule for Apparel' (SRA) for 'lesser-developed beneficiary countries',[10] 22 SSA countries enjoy an additional duty-free preferential access for apparel

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[1]Eligible May 2002; ineligible Jan. 2005; regained Oct. 2011.
[2]AGOA trade preferences granted in October 2003.
[3]Eligible Oct. 2000; ineligible Jan. 2010; regained Oct. 2011.
[4]Eligible Oct. 2000; ineligible Jan. 2013; Restored Dec. 2014.
[5]Eligible Oct. 2000; ineligible Jan. 2010; restored June 2014.
[6]Eligible Oct. 2000; ineligible Jan. 2013; restored Dec. 2013.
[7]Eligible Oct. 2000; ineligible Jan. 2006; restored June 2007; ineligible Jan. 2009; restored Dec. 2009.
[8]Eligible Oct. 2000; ineligible Jan. 2010; restored Oct. 2011.
[9]Eligible Dec. 2012; ineligible Jan. 2015.
[10]Lesser-developed countries are those with a per capita gross national product of less than $1,500 a year in

made from fabric originating anywhere in the world. The 'rule of origin' provision has been relatively more liberal to this group of countries. For the other[11] SSA countries, under 'rules of origin' requirements, the sum of the cost or value of the materials produced in one or more AGOA beneficiary countries plus the direct cost of processing operations may not be less than 35 percent of the appraised value when the product is imported to the US. The impact of 'rules of origin' is not clear in terms of its effect on exports and subsequent gains in trade and investment. When it is a binding constraint, it may restrict export opportunities. It could also benefit countries in encouraging domestic manufacturing by encouraging sourcing of apparel from domestic production and processing. The subsequent impact on the local economy of having either a more liberal or restrictive 'rule of origin' requirement is still an open question. In addition to the rules of origin, preferential treatment for textile and apparel requires that all beneficiary countries adopt an effective visa system and related procedures that assist in complying with the 'rules of origin' requirements.

The most recent AGOA Extension and Enhancement Act of 2015 calls for greater reciprocity in the elimination of barriers to trade and investment in SSA. It put forward an out-of-cycle review mechanism, that '*at any time...*' the Office of the U.S. Trade Representative (USTR) '*may initiate an out-of-cycle review of whether a beneficiary country is making continual progress in meeting the requirements*' for eligibility. This allows entities from the private sector or '*any interested person, at any time*' to file a petition with respect to the failure of compliance of a country '*with eligibility requirement*'.[12] These changes might adversely affect future export opportunities by raising uncertainty.

1998 as measured by the World Bank.

[11]See a full list of these countries in Table 1.

[12]In July 2017, USTR announced an initiation of an out-of-cycle review of the eligibility of Rwanda, Tanzania, and Uganda in response to a petition filed by a trade group that represents secondhand clothing exporters - the Secondary Materials and Recycled Textiles Association (SMART).

Through the various provisions, AGOA has provided a policy architecture in the form of attractive tariff schemes to promote SSA exports to the US. The next section discusses related literature on the trade creation impacts of PTAs and AGOA as well as the contribution of this study to the analysis of the impact of AGOA and similar PTAs.

3 Related Literature

The underlying theoretical framework in analyzing the trade impact of preferential trade agreements was pioneered by Viner (1950) who presents an evaluation of the welfare impact of PTAs through '*trade creation*' and '*trade diversion*'. Subsequent developments in Kemp and Wan Jr (1976), Grossman and Helpman (1993), Bhagwati and Panagariya (1996), Panagariya (2000) and Francois et al. (2006) extend the conceptual underpinnings to better understand the impact of PTAs. The conceptual framework for this study closely follows this simple general equilibrium framework that predicts that developing countries could expand exports to advanced economies with exclusive access through preferential trade agreements.

Even though the underlying drive for PTAs is to promote exports and hence economic transformation in developing economies, empirical evidence has not been conclusive. Empirical findings of impact were largely mixed (Francois et al., 2006; Klasen et al., 2015). For example, Cirera et al. (2016) finds a positive impact of preferential regimes on developing countries' exports to the EU. Examining EU preferential access for developing countries, Cipollina and Salvatici (2010b) also show that there is robust evidence for the positive impact of EU preferences on exports from developing countries. Using data for multiple preferential access schemes and countries over the period 1960-2008, Gil-Pareja et al.

(2014) present strong evidence that AGOA, EBA, ACP (African Caribbean Pacific)-EU and GSP programs of EU, US, Canada and other advanced economies have a positive effect on developing countries' exports to the corresponding developed markets. Similarly, Rose (2004) finds a strong positive impact when the GSP was extended from advanced to developing countries though there was no impact due to participation in GATT (WTO). Yet, there are other studies that yield seemingly contradictory results on the overall impact of PTAs.

In a study of 184 countries for the period 1953-2006, Herz and Wagner (2011) find that, on average, participation in a PTA led to a 4% reduction in exports. Herz and Wagner (2011) show that GSP tends to foster developing countries' exports in the short-run, but hampers them in the long-run, hence suggesting that GSP does not seem to serve as an instrument to enhance economic transformation of developing economies.

In Sub-Saharan Africa, evidence on the impact of such non-reciprocal trade agreements is very scarce. Similar to the evidence of impact of PTAs, in general, results of impact are also mixed. Using a simple partial equilibrium framework, examination of the potential impacts of AGOA by Mattoo et al. (2003) suggest that there are increased prospects for African countries to raise exports due to AGOA. Examining the scope and value of AGOA in 2002, Brenton and Ikezuki (2004) suggest that eligible countries would see very small gains in exports in products eligible under AGOA, since most already have access under the GSP. Benefits, however, are expected to be sizable due to the apparel provision. Using disaggregated product data up to the year 2006,[13] Frazer and Van Biesebroeck (2010) show that there is a strong positive impact on imports to the US

associated with AGOA. These

[13]For most countries AGOA was in effect in late 2000 or 2001. Hence this effect only captures a very short-run effect.

results, however, vary across product groups with apparel and petroleum having the biggest impact. Brenton and Hoppe (2006) suggest that AGOA has fallen short of the potential impetus it could have provided, though they report export gains in apparel due to AGOA in a few countries. Similarly, Tadesse and Fayissa (2008) show that there is a positive impact of AGOA in exporting new products while its impact on expanding exports of existing products has been minimal. On the other hand, Mueller (2008) suggests that AGOA has had no significant impact on overall exports from SSA to the United States. Similarly, Seyoum (2007) finds that AGOA has no discernible impact on agricultural exports.

With the exception of a few studies, mainly Frazer and Van Biesebroeck (2010), almost all (See Anderson and Van Wincoop, 2003; Rose, 2004; Brenton and Hoppe, 2006; Cipollina and Salvatici, 2010a; Aiello et al., 2010; Gil-Pareja et al., 2014; Cirera et al., 2016) employ augmented versions of gravity models of trade to identify the impact of PTAs on trade flows. However, findings that rely on the empirical gravity equation for estimation may be subject to various estimation problems. For example, the standard empirical method used to estimate gravity equations may be using inappropriate functional form (Sanso et al., 1993; Silva and Tenreyro, 2006). Even then, estimation of PTA impacts using catch-all dummies for eligibility in a PTA may be hiding the heterogeneous impacts of various non-reciprocal trade agreements across countries. Hence, estimating average impacts across countries may not be informative if impacts vary across countries and various PTAs may have differing impacts. This may also explain why the estimates of coefficients are often unreliably inconsistent across studies, either due to the composition of countries or PTAs. Most importantly, the non-experimental nature of the data makes it onerous to provide proper identification. This is largely because traditional models ignore the critical need to properly characterize the counter-factual. The reliability of the generation of the synthetic

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controls relies on the strength of the theoretical foundation of the gravity model, which has long been well established (Anderson, 1979, 2011). With regards to the empirical applications of the gravity model, however, there are still challenges in effectively estimating impact because of the challenges of estimating the counter-factual.

Using SCM minimizes this shortfall in estimating impact. Estimating impact of AGOA for individual countries separately by providing a reasonably acceptable counter-factual addresses the limitations associated with cross-country panel estimates of impact. The main contribution of this study to the running literature on the trade impacts of PTAs is two-fold. First, by employing SCM, it introduces a modern empirical approach to the analysis of the impact of PTAs that attempts to address most of the challenges in existing empirical frameworks. Second, it extends this literature by identifying sources of impact by further examining potential factors for the expected heterogeneous impact of PTAs with a focus on AGOA. In addition, empirical evidence on the role of PTAs is very scarce in SSA. Findings as to why there are heterogeneous impacts of AGOA could inform policy both in the design and structure of next-generation PTAs as well as in the design of domestic policy instruments necessary to enhance the capacity of economies to take advantage of PTAs.

Though studies that employ triple difference-in-difference (DD) (Frazer and Van Biesebroeck, 2010; Fernandes et al., 2019) to evaluate the impact of PTAs provide a much better estimate in better understanding impact across product groups, they still suffer from the basic assumption that underlies the approach. That is, DD estimators provide unbiased treatment effect estimates only if, in the absence of treatment, the average outcome for the treated and control groups follow parallel trends. However, in the absence of proper control and treatment, trade flows will not have followed parallel trends since the factors

that determine the outcome, exports to the US in this case, would have time-varying impacts on exports. This is particularly the case in an ever-changing trade regime and changing and shifting global environment. That is, even without AGOA, we expect trade flows to change due to changes in observable and unobservable characteristics of these economies. SCM allows for changes over time in export or the outcome variable following changes in observed and unobserved confounding variables.

4   Synthetic Control Method

To identify the impact of AGOA on exports in SSA, we use the synthetic control method (SCM), a near-experimental modern approach pioneered by Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2015). SCM provides a rigorous quantitative framework for carrying out comparative case studies and has been effectively used in analyzing impacts of openness (Nannicini and Billmeier, 2011), economic liberalization (Billmeier and Nannicini, 2013) and inflation targeting (Lee, 2010). In the analysis of the impact of the 1995 EU-Turkey Customs Union, Aytuğ et al. (2017) adopt SCM as a suitable approach to examine the subsequent impact.

SCM adopts a data-driven approach to construct a composite synthetic control group or counterfactual that mimics the characteristics of the treatment group in the pre-treatment period. The gap between the synthetic counter-factual and the treatment represents the impact of the treatment, after the treatment period. Relative to traditional regression methods, transparency and safeguard against extrapolation are two attractive features of the SCM (Abadie et al., 2010). It builds on difference-in-difference estimation, but uses arguably

more attractive comparisons to get causal effects (Athey and Imbens, 2017). It provides a framework to address endogeneity associated with omitted variable bias by accounting for the presence of time-varying unobservable confounders (Billmeier and Nannicini, 2013). Following Abadie et al. (2010, 2015), the basic rationale underlying the SCM is described as follows.

Let Y_{it}^N be the outcome in terms of trade or exports that would be observed in the absence of the intervention or participation in AGOA for country units $i = 1, 2, \ldots, J+1$ and time periods $t = 1, 2, \ldots, T$. Let T_0 be the number of pre-intervention periods, where $1 :(T_0 < T$. Let Y_{it}^I be the outcome in terms of exports that would be observed for country i at time t if unit i is exposed to the intervention in periods $T_0 + 1$ to T. The intervention or participation in AGOA is assumed to have no effect on the outcome of trade before its implementation period. Then, we can define the difference between Y_{it}^I and Y_{it}^N as the effect of participation in the PTA for country i at time t, if country i is participating in the PTA in periods $T_0 + 1, T_0 + 2, \ldots, T$ by:

$$\alpha_{it} = Y_{it}^I - Y_{it}^N \tag{1}$$

Since only Y_{it}^I is observed in periods $T_0 + 1$ to T, we use SCM to estimate the counterfactual Y_{it}^N which is the level of trade of a country that has participated in the PTA had the country not participated in the PTA. Assuming only country $i = 1$ is eligible for AGOA after period T_0, we are interested in estimating $[\alpha_{1T_0+1}, \alpha_{1T_0+2}, ..., \alpha_{1T}]$, the impact of AGOA for each period following the AGOA eligibility of a country.

Since no single unit or country is similar to the treated unit before treatment, Abadie et al. (2010, 2015) propose estimating optimal weights $W^* = (w_2^*, \ldots, w_{J+1}^*)$, that can be

used to get a suitable control from a weighted average of similar countries that did not participate in the PTA. The optimal weights vector W^* for each country can be obtained following a synthetic control algorithm[14] that minimizes the objective function, i.e. a measure of the distance between the predictors of the treated unit X_1 and those of the synthetic control, X_0. i.e.

$$\underset{x}{\text{Minimize}} \quad \sum_{m=1}^{k} v_m (X_{1m} - X_{0m}W)^2$$
$$\text{subject to} \quad w_2 \geq 0,...,w_{J+1} \geq 0;$$
$$w_2 + ... + w_{J+1} = 1. \tag{2}$$

where v_m is a weight that reflects the relative importance that we assign to the mth variable when we measure the discrepancy between X_1 and X_0W. X_1 is a $(k \times 1)$ vector of pre-treatment variables that we use to match as nearly as possible to the treated country and X_0 is a $(k \times j)$ matrix of the values of the same variables for the countries in the donor/control pool. To provide a theoretical foundation to the choice of these variables, we follow a well-established literature in gravity models to explain trade and export performance of economies or trade flows (Anderson, 1979; Bergstrand, 1985; Head and Mayer, 2013). The relevant model suggests that incomes measured by GDP and GDP per capita of trading partners, population, weighted distance between trading partners and a host of idiosyncratic factors including common language and size of country explain trade flows. In the construction of a synthetic control, we iterate over a set of gravity model variables as well as other country characteristics to identify the counter-factual for each AGOA eligible country. The donor pool is composed of all African countries that are not eligible to AGOA and low- and middle-income countries in South and East Asia depending on

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[14]The synthetic control $W^* = (w_2,...,w_{J+1})$ is selected to minimize $\| X_1 - X_0W \|$ subject to $w_2 \geq 0,...,w_{J+1} \geq$ 0 and $w_2 + ... + w_{J+1} = 1$, where for any $(k \times 1)$ vector u, $\| u \| = \sqrt{u^T V u}$

which weighted pool provides a better fit as captured by the mean squared error prior to treatment.

SCM employs an iterative cross-validation method to select the optimal weights so that the synthetic controls closely reproduce the actual outcome variable before treatment. If the synthetic country and the counter-factual have similar behavior over extended periods of time prior to the treatment, the gap in the outcome variable after the treatment is interpreted as the impact of participation in a PTA or treatment. A similar trajectory between an AGOA country and its corresponding synthetic control for the pre-AGOA period suggests that the control and treatment exhibit similar characteristics in the main predictors of trade flows, both observed and unobserved. Conditional on a good match in the periods before treatment, Abadie et al. (2010) show that the bias in SCM is bounded by an expression that converges to zero with the number of pre-treatment periods, even when treatment or eligibility is correlated with unobserved heterogeneity. That is, $\hat{\alpha}_{it} = Y^I_{it} - \sum_{j=2}^{J+1} w^* Y_{jt}$ is an unbiased estimator of α_{it} given in Equation 1. Hence, $\hat{\alpha}_{it}$ represents the estimated trade impact of AGOA.

After estimating the impact of AGOA by the value of exports, we estimate fixed effect panel regression models to identify the underpinnings of the heterogeneity in impact. The goal is to identify what essential country characteristics explain observed differences across countries in terms of impact. We test if the gains can be explained by various factors in existing studies including institutional quality, infrastructure and/or the macroeconomic environment.

5   Data

The necessary set of data includes a panel of country-level exports from Sub-Saharan African countries to the United States; a set of macroeconomic variables that would traditionally explain variations in trade flows from the gravity model literature and the time and eligibility information of the AGOA treatment. The analysis draws trade flows data from Sub-Saharan Africa to the US from the US International Trade Commission (USITC). Data on AGOA eligibility of countries come from the US Government Accountability Office and the International Trade Administration within the US Department of Commerce.

The outcome variable is the aggregate value of exports from each country to the United States (in Millions of US $). Data on exports originating from SSA countries are often incomplete. In addition, variation in measurement across countries may make cross-country comparisons limited. Hence, we use annual US imports data from African countries to examine impact. This also ensures consistency of measurement across countries, besides the reliability and completeness of data from the US. Using import price indices obtained from the US Bureau of Labor Statistics (www.bls.gov), import values are deflated to constant 2000 USD.

In 2013, total US imports from AGOA eligible countries totaled $26.8 billion, more than four times the amount in 2001. Petroleum products continued to account for the largest portion of AGOA imports with an 86 percent share of overall AGOA imports principally accounted for by five countries. Between 2013 and 2015, there is significant decline - more than a 25% - in AGOA exports to the US mainly due to the massive decline in commodity prices. Total non-oil US imports from AGOA eligible countries were about $ 4.8 billion

in 2013, more than triple the amount in 2001. A few non-oil sectors including apparel, footwear and agricultural produce experienced increases in US imports from AGOA countries during this period. In order of importance in non-oil exports, transportation equipment, minerals and metals, textile and apparel, agricultural products and chemicals and related products accounted for the biggest shares.

Table A4 in the appendix presents average annual exports to the US (in constant 2000 USD) for the countries included in the study for four periods between 1993 and 2015. Figure 1 presents the average annual exports of AGOA beneficiaries before and after AGOA for the entire period 1993-2015, where the particular year of eligibility varies across countries. Among the major exporters, Nigeria, Angola, South Africa, the Republic of Congo and Chad have registered significant increases in exports to the US post- AGOA. Other countries that increased exports include Kenya, Lesotho, Ghana, Cameroon, Botswana, Namibia, Ethiopia and Liberia. The next section discusses if the rise in exports is associated with AGOA, by presenting the estimated impact using SCM.

Figure 1: Average Annual Exports: Pre and Post-AGOA
(a) Large Exporters to the US
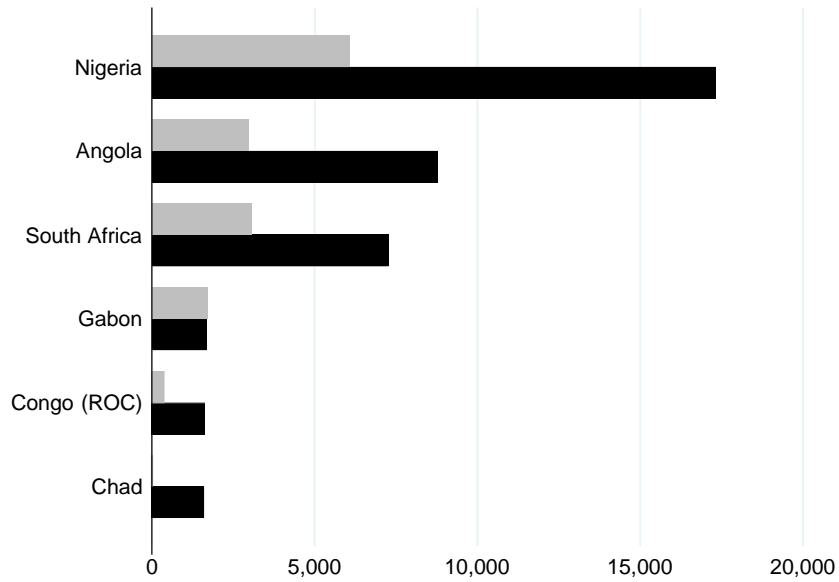
(b) Medium to Small Level Exporters to the US
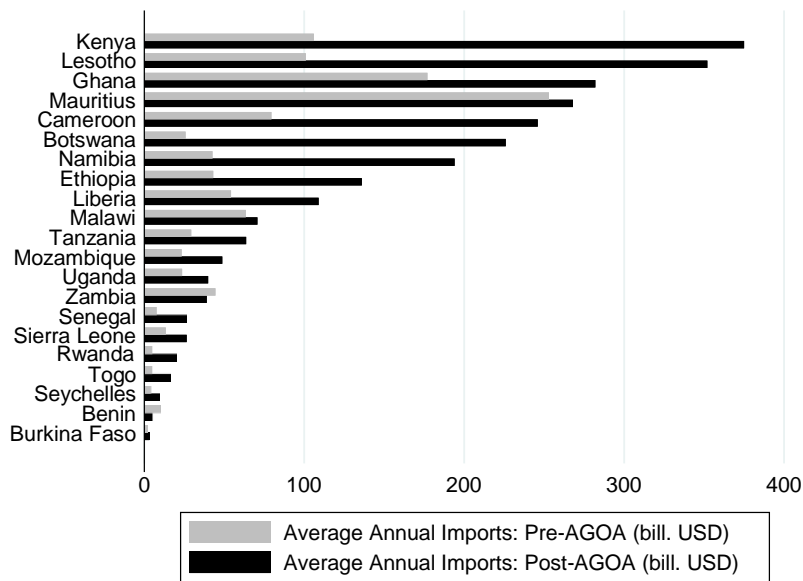
The second set of data necessary to identify factors that may explain the heterogeneity in impact draws from multiple sources. Macroeconomic data such as incomes, population, size

of country, debt, financial development, access to infrastructure such as mobile subscriptions and telecom come from the World Development Indicators (WDI) of the World Bank. Indicators on institutional quality are from the Country Risk Project and Doing Business World Bank data projects. Other gravity model variables such as measures of bilateral distance between SSA countries and the US, a set of dummy variables including common language between countries and the US obtains from the GeoDist database (Mayer and Zignago, 2011). Table A1 in the appendix presents a list of variables used in the study, their definitions and sources, while Table A3 provides basic summary statistics.

6 Discussion of Results

The first section below presents a discussion of the findings from the SCM, whereas the next section discusses the underlying factors explaining the variations in the gains from trade due to AGOA.

6.1 Impact of AGOA: Results from SCM

Would trade flows have been different without AGOA? If Sub-Saharan African countries would have still experienced similar trends without AGOA, the trade creation or lack thereof in the post-AGOA period might not be fully attributed to AGOA. To answer these questions, we use synthetic controls - estimated country experiences of trade flows had countries not been treated with AGOA. The SCM procedure follows Table 1 in identifying the period countries became eligible to estimate the treatment effect. Most of the countries in the sample were eligible towards the end of 2000 or 2001 while a few others were eligible in different years afterwards. The estimation is based on specific years of entry into the AGOA framework, which may vary across countries. Hence, SCM employs this particular

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year of eligibility[15] as the landmark year to estimate the impact after AGOA.

Figure 2 presents results of the SCM estimation for 23[16] countries that are eligible for AGOA. The figure depicts the export trajectories of each of the 23 SSA countries in the study and their synthetic counter-factual for the period 1993-2015. The solid red line represents the observed trajectory of an SSA country's exports to the US measured by actual imports to the US. The broken blue lines depict the export trajectories of the synthetic country which captures the estimated aggregate value of exports a country would have attained if it had not been eligible for AGOA. The vertical broken line indicates the year of eligibility for AGOA.

Our estimate of the treatment effect, that is the trade impact of AGOA, is the difference between the country's exports and that of its synthetic counterpart after treatment. This gap represents how much exports would be higher or lower than what they would otherwise be without AGOA. In most cases, the synthetic country closely reproduces the export trajectory of actual exports before treatment. This suggests a better fit and hence a better estimation of impact in the post-treatment period.[17] This gap or treatment effect represents the estimated gains in trade registered due to AGOA.

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[15]The year of eligibility takes on 2001, for example, when the specific year of entry into the program is late 2000.

[16]A few countries are not included because they fail to satisfy criteria for basic fit in terms of their size, levels of income or other characteristics of their economies. Countries that lost their eligibility during 2001-2015 are also excluded, except Madagascar, which retained eligibility at least until 2010.

[17]In addition to simple observation and since traditional inference is not feasible, we undertake placebo tests to check the fitness of our model. We also estimate the root mean square (RSME) before treatment to evaluate the fit of the estimated synthetic control to the observed data. As a result, we dropped countries when there is a poor fit.

Figure 2: Export Trends and Synthetic Controls, SSA (1993-2015)
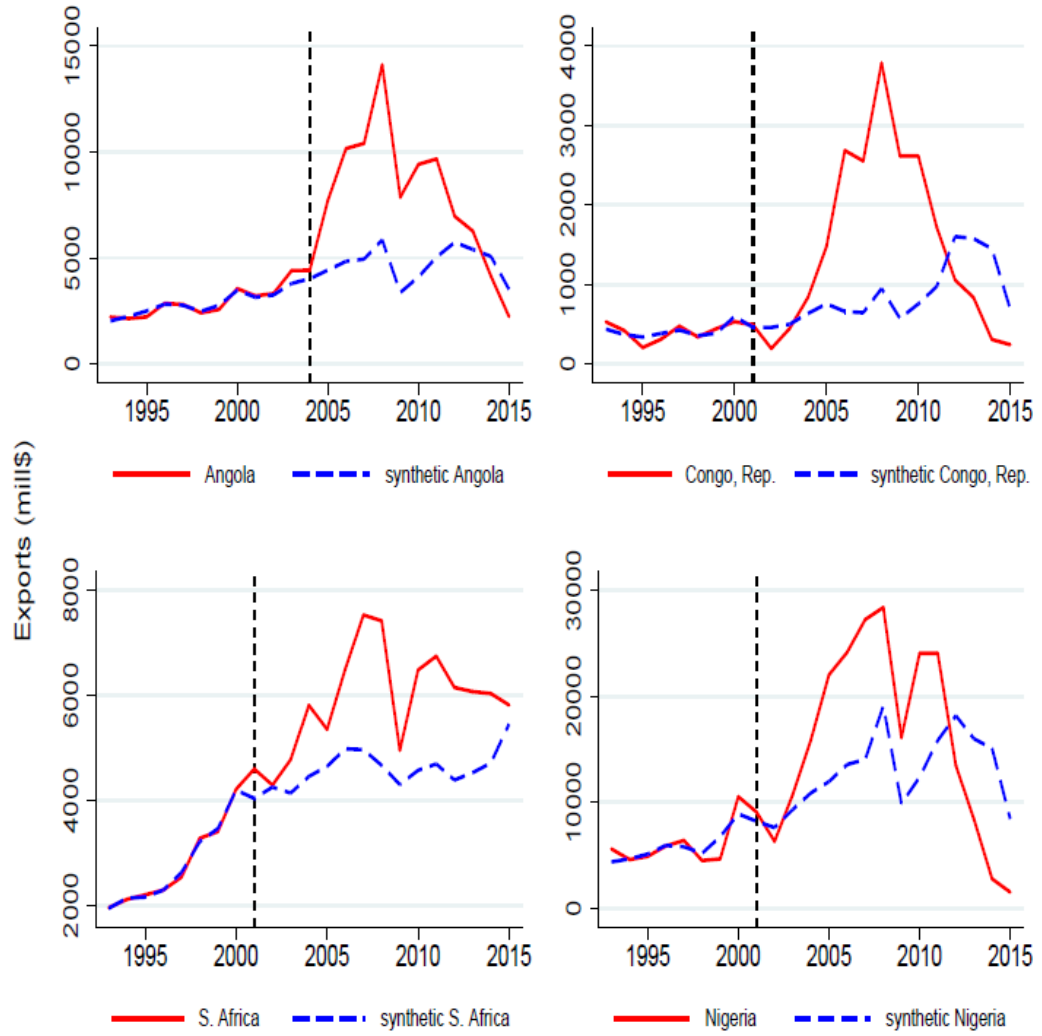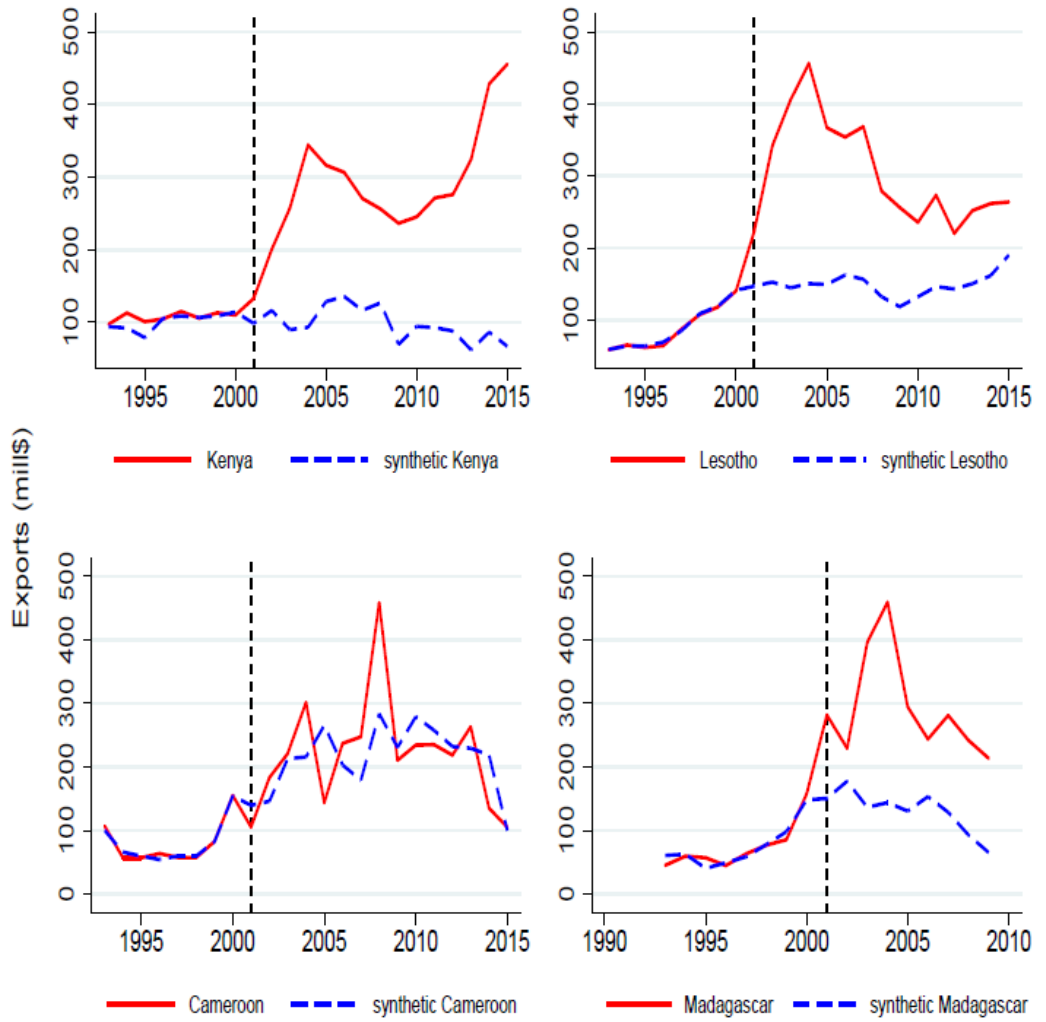
Figure 2: Export Trends and Synthetic Controls, SSA (1993-2015) (Continued.)
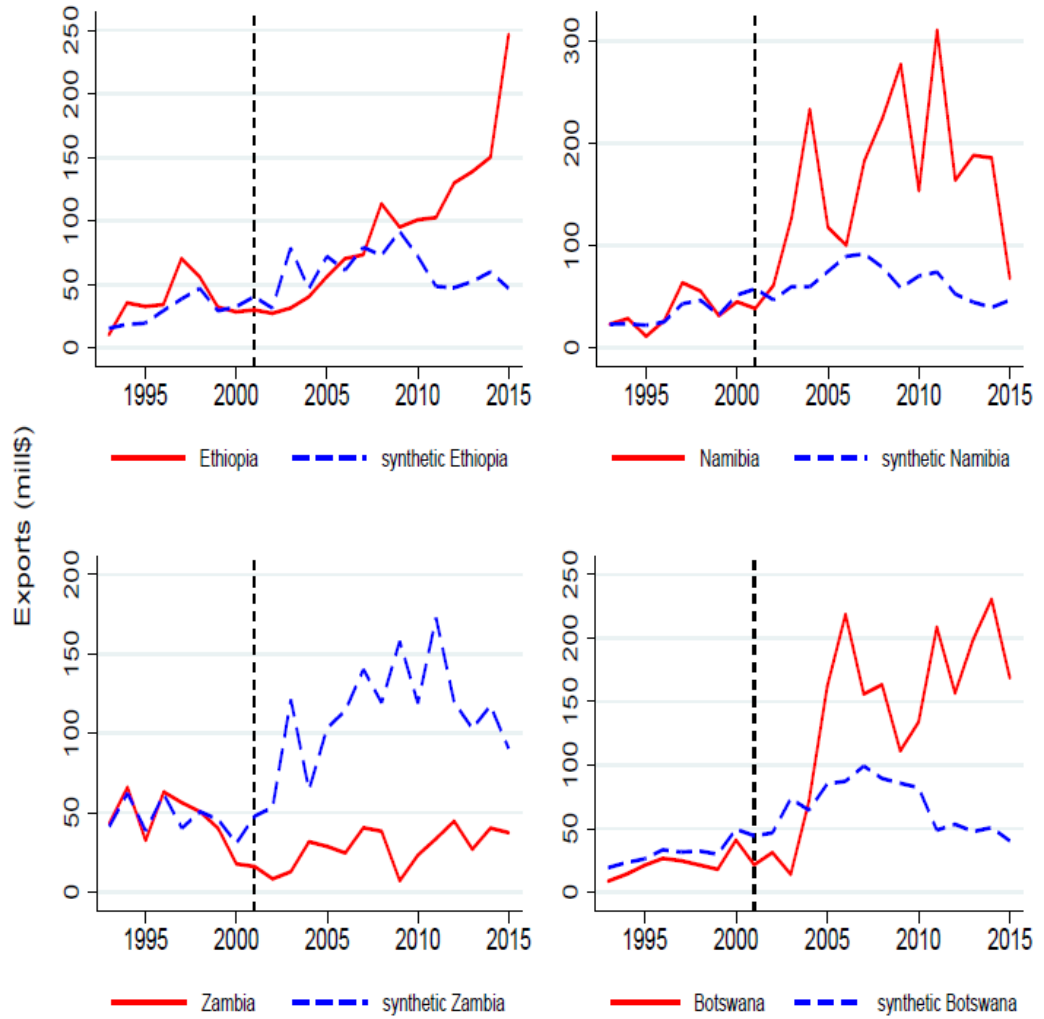
Figure 2: Export Trends and Synthetic Controls, SSA (1993-2015) (Continued.)
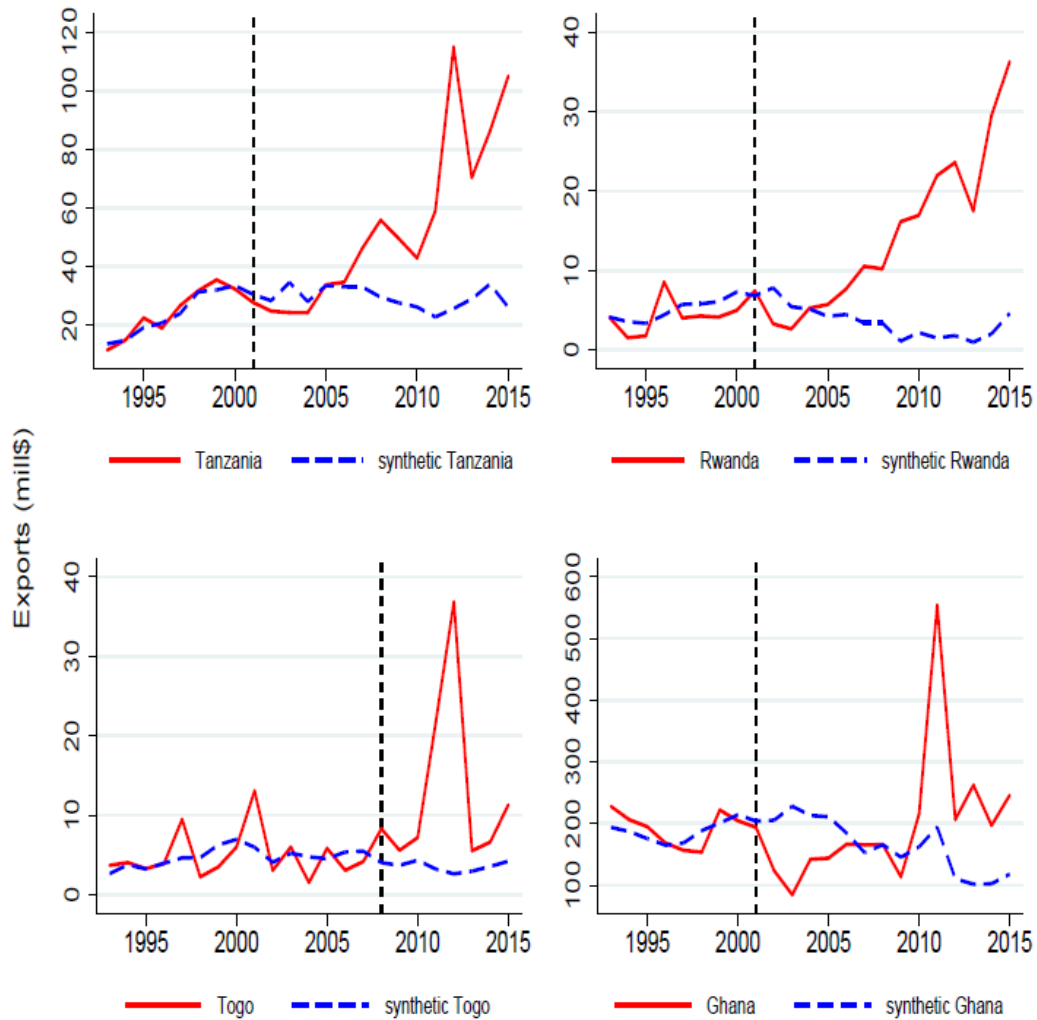
Results suggest that most of the countries that were eligible for AGOA have expanded their exports to the US after the preferential access. A few others have failed to register any gains in exports due to AGOA. There are, however, significant variations in the impact over time and across countries. The common trend in most countries is that there was a rise in exports immediately after eligibility. Eventually, however there is a decline in exports. This is largely due to a fall in US demand for exports from Africa and elsewhere in the wake of the 2008-2009 financial crisis. This was further exacerbated by the substantial

collapse of commodity prices subsequently. There were, however, a few countries that registered significant gains in exports continuously even in the midst of the financial crisis and declining commodity prices.

In Angola, Nigeria, South Africa, the Republic of Congo and Namibia, there was a significant rise in exports after eligibility, but the gains diminished eventually. Angola, South Africa, Kenya, Namibia, Ethiopia, Botswana and Tanzania registered the biggest gains in exports as a result of AGOA. Relative to their small size, Gabon, Togo and Lesotho also saw large gains in exports due to AGOA. Still, there are variations among these groups of countries. Examination of exports by product classification reveals these variations. Most of the gains are associated with an increase in exports of petroleum, agricultural produce and beverages, while only a few countries registered gains in exports of industrial commodities. For countries such as Angola, Gabon, Nigeria and the Republic of Congo, for example, all the gains are due to the rise in exports of commodities including petroleum and other minerals. Due to the massive exposure to a single commodity, a drastic fall in total value of exports is evident in the immediate aftermath of the financial crisis, where US demand fell, and commodity prices declined drastically eventually. This contributed to the biggest decline in export gains from AGOA and reflects the risks of heavy exposure to a single export market-the US, as well as the dependence on single commodity export. Though AGOA has substantially raised commodity exports, it also exposes countries to shocks to the US demand as well as shocks to prices of commodities.

The few select success stories that registered sizable increase in aggregate exports also

registered expansion in export of diverse set of commodities including agricultural produce and beverages, manufacturing goods and other consumer goods. This group comprises South Africa, Kenya, Ethiopia, Tanzania, Botswana, Rwanda and Lesotho all of which (except RSA) enjoy preferential access to the apparel provision as well as the special rule for apparel. The relaxation of the 'rules of origin' requirements through the special rule for apparel may have contributed to the expansion of apparel exports. This suggests that further relaxation of the 'rules of origin' requirements would lead to increased apparel exports by relaxing the sourcing of imported inputs. Still, the long run impact of relaxing the rules of origin requires further examination. Because, gains in exports could be offset by the loss in local production gains when a greater share of exportable products is imported primary and intermediate inputs.

There is some variation in gains within this group as well, with South Africa being the biggest benefactor while Tanzania and Rwanda only saw an increase in exports as well as diversity of exports after 2005. The widely publicized spurt in foreign direct investment and ensuing expansion of Lesotho's apparel industry due to AGOA aligns with our findings that countries whose gains accrue from non-fuel exports register consistently increasing gains. Following AGOA, in 2004 Lesotho - one of the smallest countries in the region - was the largest exporter of apparel to the US in SSA. In the wake of the expiration of the Multi-Fiber Agreement (MFA)[18]; however, there was a decline in textile exports from countries such as Lesotho whose primary exports are textile. The decline in textile exports to the US from Lesotho beginning 2005 can be seen clearly in Figure 3. This has raised concerns about the prospects of industrialization based on foreign direct investment seeking preferential access

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[18]Under the MFA, the United States and other advanced economies imposed quota restrictions on textile imports from developing countries, aimed at protecting local textile manufacturing from emerging competition. Initially established, in 1974, it has since expired in 2004 (January 2015).

rather than other comparative advantages. Because, with the erosion of the preferences as shown by the expiry of MFA, there is a greater risk of losing exports and related industries. Though AGOA provided for trade diversion from Asia to SSA in textile manufacturing and export to the US, erosion of the preferences due to either MFA expiration or other changes in regional trade agreements introduce uncertainties since textile manufacturing was not supported by either comparative or competitive advantage but preferential tariffs.

Countries that have not seen gains in trade from the preferential market access include Benin, Cameroon, Guinea, Zambia and Mozambique. US goods imports from Cameroon declined by about 16% between 2005 and 2013. Its main exports included wood, mineral fuels and cocoa. In comparison to many SSA countries, Zambia has a relatively bigger share of exports to the US. However, the estimated rise in exports that was expected over the last two decades even without AGOA is much higher than the stable and constant export performance it registered after AGOA. This suggests that Zambia is one of the countries that would have expanded exports to the US regardless of AGOA. Any increase in exports, hence, should not be attributed to AGOA.

Figure 3: Annual Average Treatment (AGOA) Effect, SSA Total
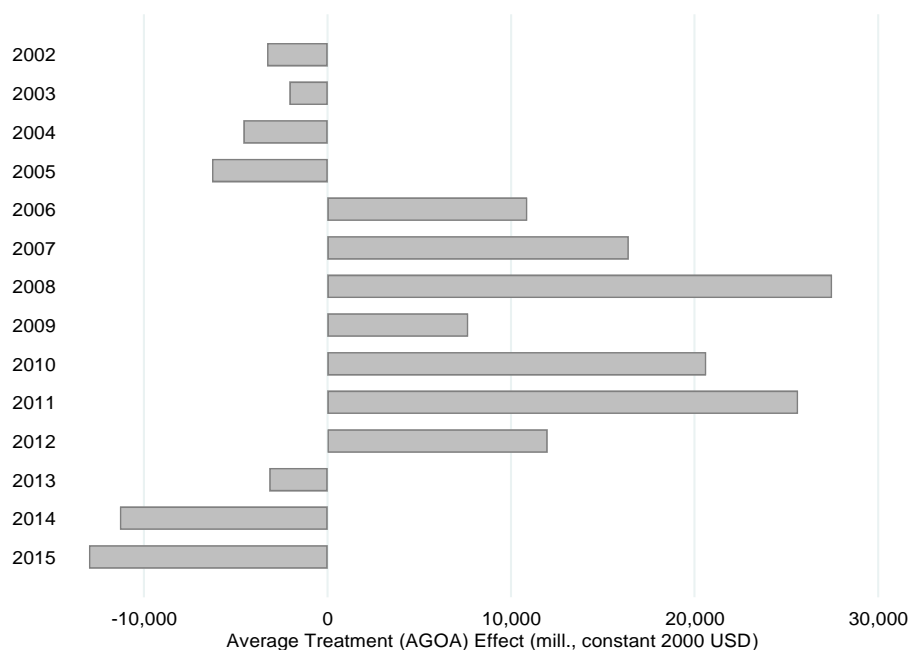
Overall, there is a considerable trade creation impact of AGOA. This can easily be seen from Figure 3 that reports the average annual treatment (AGOA) effect in export gains. Much of the gains accrued after 2005 while there was a drastic decline after 2013. In addition to the variation in export gains across time, the trade impact gains exhibit considerable variation across countries in the post-AGOA period. Figure 4 presents an aggregated measure of gains in terms of exports over the period 2001-2015 broken down in to three periods: 2001-2005, 2006-2011 and 2012-2015. The map indicates the change in the trade impact over time as measured by the average annual treatment effect gains over the three periods. AGOA impacts were the largest in South Africa, Nigeria, Angola and the Republic of Congo. As discussed above, a few countries which have also been resilient in their growth performance in SSA registered a continuous rise in their exports while a few registered significant declines associated with the commodity price decline. Nigeria, Angola and the Republic of Congo registered the biggest declines after a large early gain due

to AGOA. South Africa, Botswana, Kenya, Ethiopia and Tanzania registered consistently increasing gains at various levels of trade. An often cited AGOA success story, Lesotho registered significant increases in export which only lessened slightly towards the end of the 2010s.

Since this is the first paper that uses SCM to estimate the impact of a unilateral trade agreement for each country, results from this study may not be directly comparable to previous studies. Because, average effects of PTAs may be hiding cross-country heterogeneity or variations across time, Figure 3 presents a comparable measure - the average treatment effect of AGOA for all eligible countries included in the study. The significantly large trade creation impacts suggest that the results are in line with previous studies such as Mattoo et al. (2003); Frazer and Van Biesebroeck (2010); Cirera et al. (2016). While these studies mostly fail to reveal the heterogeneity across countries that is predominant, results are similar to earlier studies that find a significantly large positive impact of AGOA.

Figure A1 in the appendix presents the export trajectories of major product categories from countries that have expanded exports other than crude petroleum or natural gas. As shown in the figure, South Africa's major exports to the US are dominated by advanced manufacturing goods such as transport vehicles while other minerals and textile exports account for a small share. In terms of textile and apparel exports, Kenya registered the biggest gains. Kenya also expanded exports into agricultural produce and other manufacturing non-apparel products. For Tanzania, Ethiopia and Rwanda, the biggest share of export gains has accrued from exports of agricultural commodities. Ethiopia and Tanzania also expanded exports into textile and apparel while Rwanda's secondary export items include minerals, mainly tantalum ores. East African countries have registered

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significant gains compared to other parts of the continent both in terms of expansion of exports and diversification into light manufacturing, particularly textiles and apparel.

An examination of the export content of countries that registered the biggest gains from AGOA reveals the importance of diversifying exports away from commodities to agricultural produce, beverages, apparel as well as manufacturing products. Countries that depend almost exclusively on fuel or other minerals for their exports to the US faced the worst decline in the wake of the financial crisis and the commodity price decline. By and large, the predominant finding is that AGOA's trade effects in the majority of SSA countries is accounted for by exports of primary commodities mainly fuel and other minerals. When the gains were derived from exports of fuel, they have been largely unsteady. When they were based on non-fuel exports, the gains have been increasing consistently over the years of AGOA eligibility. In the long term the impact of AGOA in exports could support the transformation of economies as long as there is diversification of exports into non-fuel products such as manufacturing and agro-processing.

What explains the successes and failures of AGOA within SSA countries? The next section attempts to explain these observed variations in the impact of AGOA, in an effort to derive useful policy lessons for Sub-Saharan African countries in order to expand their export capacity and take advantage of preferential access opportunities such as AGOA.

Figure 4: Map of Total Trade Impact of AGOA (Mill. of $) (2001-2015)
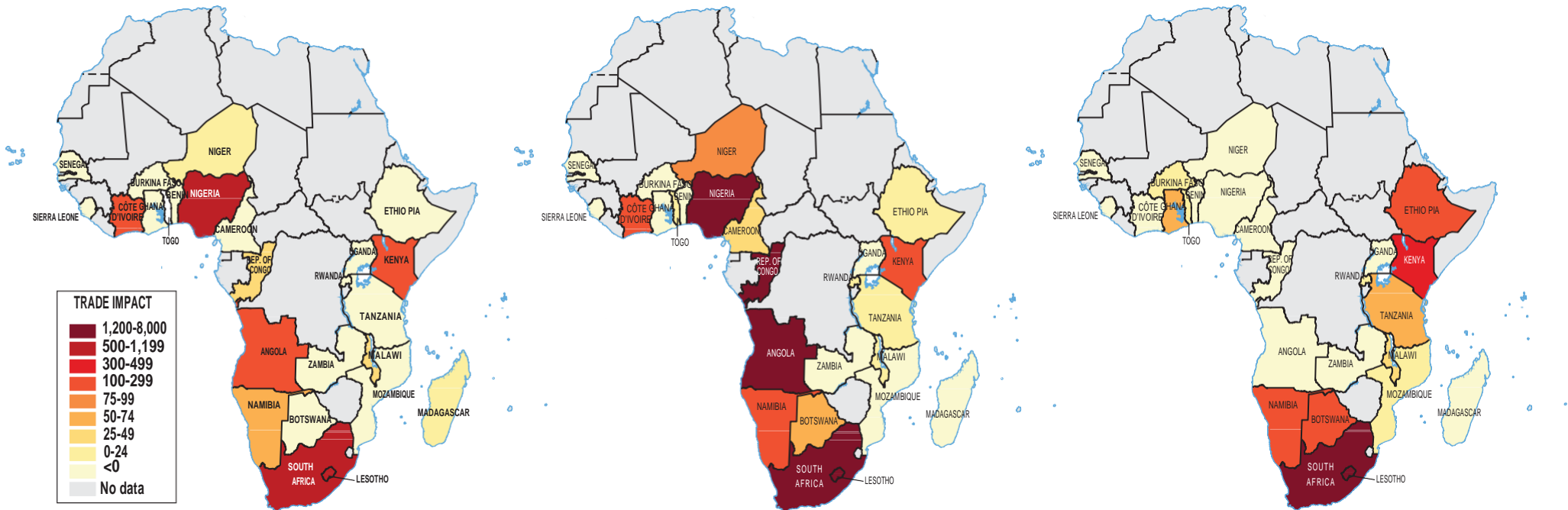
6.2   Determinants of Variations in Impacts under AGOA

External trade barriers continue to be vital in understanding trade flows among countries. Even with the easing of trade barriers through preferential access such as AGOA; there are fundamental factors that limit a country's capacity to robustly engage in international trade and exports. In SSA countries, supply-side constraints are receiving increasing attention on improving their trade performance. Analyses of African trade flows indicate that the relatively low performance is largely due to poor infrastructure, particularly transport and poor trade facilitation (Limao and Venables, 2001; Wilson et al., 2005). Wilson et al. (2005) find that raising capacity in four areas of trade facilitation, namely port infrastructure (air and maritime), customs environment, regulatory environments and communication infrastructure would significantly improve trade performance, especially exports. Physical infrastructure, soundness of the macroeconomic framework and quality of institutions appear to be major determinants of export performance (UNCTAD, 2007).

In addition, various forms of institutional quality are essential determinants of trade performance (Levchenko, 2007; Nunn, 2007; Francois and Manchin, 2013). These include contract enforcement, property rights protection, judicial quality, ease of regulations, transparency and corruption. Nunn (2007) suggests that contract enforcement explains more of the pattern of trade than physical capital and skilled labor combined. Francois and Manchin (2013) and Anderson and Marcouiller (2002) argue that hard physical infrastructure is much more important than the rest. Both the institutional framework and the quality and quantity of physical infrastructure may be essential in the push for greater trade and exports. Trade facilitation either in the form of hard or soft infrastructure is found to have improved export performance for developing countries (Portugal-Perez and Wilson, 2012). For SSA in particular, issues of security and fragility are often considered significant determinants

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of trade performance, because insecurity may act as a hidden tax on trade (Anderson and Marcouiller, 2002).

Another layer in the drive towards greater investment and export capacity is a macroeconomic environment characterized by stable and competitive exchange rates, stable prices and low levels of debts. Poorly managed exchange rates can have unfavorable outcomes by limiting investment and export opportunities (Rodrik, 2008). Moreover, the package of formal and informal labor market and wage bargaining institutions matters in the effort to attract investment and expand export capacity (Aidt and Tzannatos, 2008). Though there is some understanding that all factors including institutions, regulatory frameworks and infrastructure are critical; it is essential for policy makers to identify priorities. The policy implication is that reform would have a greater impact if it focused on a few priorities.

Using the estimated trade effects of AGOA, we provide a simple test to identify fundamental characteristics of countries in the effort to evaluate the heterogeneity in the effects. The goal is to better understand which of these particular factors are more important in explaining the variation in the impact of AGOA after controlling for basic country characteristics. We control for specific features of countries that could determine their participation in trade with the US in particular. Using country fixed effects might help account for these time-fixed variations across countries. One needs to exercise caution in considering the results as robust causal mechanisms since most determinants are correlated and endogenous. However, similarities in the countries considered suggest that any significant difference in the determinants could be very useful in understanding the heterogeneity in exploiting export opportunities as a result of AGOA and other export opportunities.

Table 2 presents results of fixed effect models using panel data for SSA countries covering the post-AGOA years 2001-2015.[19] Sensitivity tests are presented in Table A5 in the appendix. Results, however, remain consistent. Samples are included for the period after AGOA eligibility since the focus is on analyzing the correlates to the trade impact of AGOA. We only include countries that are eligible to AGOA since the interest is to explain the variations in the estimated trade gains. The dependent variable is the SCM estimated trade impact due to AGOA, after accounting for potential trends in trade in the absence of AGOA. The findings suggest various forms of infrastructure, macroeconomic fundamentals and institutional quality explain much of the variation in export gains from AGOA. Physical infrastructure in the form of access to telecommunication services and other ICT technologies are critical in expanding the export capacity of countries in the effort to take advantage of the preferential access created by AGOA. Institutions of rule of law and legal structures also represent an essential component in enhancing export capacity. Indicators of political corruption and aggregate indicators of the quality of government have not shown to have any significant impact on trade. Neither does political stability. Yet, the evidence on the role of the rule of law, legal structure and security of property rights is robust. This can be attributed to confidence in contract enforcement and effectiveness of judicial procedures in facilitating business, business related transactions and resolving conflicts. This provides useful insights in determining policy priorities in terms of improving the investment climate as well as strengthening the legal institutions in the effort to enhance export capacity in the continent.

The role of sound macroeconomic conditions, as captured by stable and competitive exchange rate prices and lower inflation, has a strong impact on performance. The signi-

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[19]The data form an unbalanced panel since the years of eligibility could vary across countries.

ficance of low inflation and competitive exchange rate for export performance is robust across various specifications. There is no significant impact of external debt accumulation on export performance related to AGOA. The role of labor market workings as measured by labor freedom - a quantitative index based on the World Bank's Doing Business study - in the form of ease of regulations concerning minimum wage, rigidity of hours, difficulty of hiring and associated costs is significant. Countries with stricter labor market regulations impose costs in terms of providing opportunities for expanding export capacity.

We show that many countries in SSA have taken advantage of opportunities provided by AGOA, but the results vary both across countries and over time within a country. Countries with better ICT infrastructure, a relatively better functioning and effective judiciary, stable exchange rates and better macroeconomic environment seem to have registered significant export gains due to AGOA. It is evident that in order to raise exports and improve trade and hence promote growth and transformation of SSA economies, we need to improve a set of institutions in property rights protection and legal structures. Though improvements in other areas of institutions such as reduction of corruption are also important, in terms of trade and exports, emphasis on the rule of law and judiciary quality seems to have greater returns. SSA countries also need to adopt a set of sound macroeconomic policies to keep inflation low and exchange rates stable and competitive. Building on the quality and quantity of physical infrastructure, both ICT and others also present opportunities for expanding exports for international trade.

Table 2: Determinants of Export Gains Under AGOA

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inflation (annual%)	-0.015***	-0.067	-0.068	-0.040***	-0.033***	-0.033***	-0.035***	-0.111***
	(0.004)	(0.764)	(0.764)	(0.002)	(0.006)	(0.006)	(0.010)	(0.207)
Exchange Rate Stability	-0.186***	-0.118***	-0.117***	-0.230***	-0.205***	-0.205***	-0.206***	-0.219***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
External Debt (% of GNI)	-0.124	0.0383	0.040	-0.151	-0.159	-0.159	-0.152	-0.081
	(0.876)	(0.580)	(0.738)	(0.645)	(0.767)	(0.767)	(0.619)	(0.525)
Mobile Subscriptions (100 people)	0.284***	0.205***	0.203***	0.369**				
	(0.009)	(0.001)	(0.002)	(0.032)				
Access to Telecom					0.331*	0.331*	0.297*	0.198*
					(0.089)	(0.089)	(0.078)	(0.079)
Legal & Property Rights	-0.103**	0.036**	0.033**	-0.052*	-0.042***	-0.0421***	-0.121***	0.200***
	(0.045)	(0.047)	(0.075)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Transparency Index	0.0134**	0.106*	0.104*	0.0140**				
	(0.022)	(0.063)	(0.095)	(0.018)				
Political Corruption	0.083		-0.008	0.118	0.122	0.122		
	(0.130)		(0.126)	(0.404)	(0.199)	(0.199)		
Political Stability	0.035	-0.103	-0.105	-0.046	-0.049	-0.049	-0.069	-0.117
	(0.369)	(0.332)	(0.244)	(0.541)	(0.754)	(0.754)	(0.926)	(0.810)
Quality of Government (ICRG)				0.0126	-0.0168	-0.0168	-0.0221	-0.112
				(0.411)	(0.793)	(0.793)	(0.803)	(0.907)
Labor Market Regulations				-0.149***	-0.132***	-0.132***	-0.107***	-0.050***
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Net Oil Exports per capita								0.532
								(0.330)
GDP		yes	yes					
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	313	292	292	298	298	298	298	298
R-squared	0.448	0.260	0.261	0.486	0.470	0.470	0.469	0.484
F-Stat	4.349	4.349	4.349	4.349	4.349	4.349	4.349	4.349

Notes: Dependent variable is the treatment effect (gap) in terms of export/trade due to AGOA (mills. US $); p-values are in parenthesis; *** significant at 1%, ** at 5% * at 10% levels. All specifications include both country and year fixed effects. All coefficients have been standardized allowing comparison as to the relative strength of each factor. A one standard deviation increase in an independent variable is associated with a rise or fall of the trade impact by β standard deviation, where β is the value of the coefficient.

7 Conclusion

This study examines the impact of the African Growth and Opportunity Act (AGOA) using the Synthetic Control Method - a quasi-experimental approach. The novelty is that it addresses fundamental problems of estimation prevalent in non-experimental methods of estimation. The main finding is that most countries registered gains in exports due to AGOA. The results, however, were varied and export gains were largely unsteady. Much of the gains are due to exports of petroleum, minerals and agricultural products, while there are few countries that were able to expand into manufacturing and other industrial goods. When the gains were derived from exports of fuel, they have been largely unsteady. When they were based on non-fuel exports, the gains have been increasing consistently over the years of AGOA eligibility. In the long term the impact of AGOA in exports could support the transformation of economies as long as there is diversification of exports into non-fuel products such as manufacturing and agro-processing. The variation in the trade impacts is largely explained by ICT infrastructure, institutions of legal frameworks, ease of labor market regulations and sound macroeconomic environment including stable exchange rates and low inflation.

The results suggest that preferential market access to Sub-Saharan African countries has the potential to improve the transformation of economies conditional on changes in the fundamental institutions of legal frameworks and property rights protection. Preferential access through PTAs such as AGOA is not a panacea, however. The same underlying factors that explain the success of countries in other spheres of economic enterprise are critical. Sound macroeconomic policies to maintain a stable and competitive exchange rate, low inflation and improving the quality of infrastructure especially ICT provide the

underpinnings necessary to allow these economies to take advantage of export opportunities provided by AGOA. Reforms in improving business should focus more on improving the judiciary quality, infrastructure and macroeconomic stability. The study suggests the need for a further dis-aggregated analysis of changes in the exports of product categories due to similar preferential trade agreements.

On redesigning the next generation of AGOA and other PTAs or in reshaping existing ones, the US and other OECD countries should consider incorporating policy commitments along with preferential access. Commitments in reforms across a range of areas to create an enabling environment for private investment and trade could enhance export capacity. The study suggests that PTAs need to be reinforced with reform-based eligibility criteria. There is a need to integrate PTAs with other efforts to deepen trade and investment between SSA countries and the US. This includes integrating AGOA with foreign aid policy instruments to effectively address the structural challenges limiting export capacity. Efforts to ease supply constraints and support the integration of African economies to global trade requires augmenting the quota-tariff-free '*preferential*' agreements with additional instruments to strengthen the capacity and competitiveness of firms in these countries. Recent initiatives such as the Compact with Africa (CwA) with a strong focus on improving the business environment, building infrastructure and promoting effective regulations and institutions seem to be catching up with the need to marry preferential access with such policy frameworks. Furthermore, expansion of the quota-tariff-free access to products most African countries may have comparative advantage in, such as agriculture and relevant manufacturing, may expand the benefits for African firms. Hence, there is an urgent need to marry aid with trade to maximize the gains from preferential access.

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Supplementary Material: "Revisiting the Trade Impact of AGOA: A Synthetic Control Approach"

Appendix A. Variable Definitions and Summary Statistics

Table A1: Definition of Variables and Source of Data

Variable	Definition [Source]
Exports to the US	Value of exports to the US (in millions of US $) [USITC (2017)]
Weighted Distance	Weighted distance between country and US [Mayer and Zignago (2011)]
GDP	Gross Domestic Product(current US $) [WDI]
GDP per capita	GDP per cap (current US $) [WDI]
Population	Population, total in millions [WDI]
Area	Area in sq. kms [WDI]
Time difference	No. of hours difference between country and the US
Inflation (annual%)	Inflation, consumer prices (annual%) [WDI]
Exchange Rate Stability	Exchange Rate Stability Index [Aizenman et al. (2008)]
Financial Development	Domestic credit to private sector (% of GDP) [WDI]
External Debt (% of GNI)	External Debt (% of GNI) [WDI]
Mobile Subscriptions (100 people)	Mobile cellular subscriptions (per 100 people) [WDI]
Access to Telecom	Average index based on mobile cellular subscriptions & fixed telephone subscriptions (per 100 people) [WDI]
Rule of Law	Composite index of rule of law in a country [QOG &
WDI] Legal & Property Rights	Index composed of judicial independence, impartial courts, protection of private property, military interference in rule of law, integrity of the legal system [QOG]
Transparency Index	Index of both transparency and accountability [QOG]
Political Corruption	Index of corruption at all three levels of government [QOG]
Quality of Government	Index composed of protection of law and order, bureaucratic quality and corruption [ICRG]
Political Stability	Likelihood government will be destabilized or overthrown by unconstitutional and/or violent means [QOG]
Labor Market Regulation	Index of ease of regulations concerning minimum wages, laws on layoffs, severance requirements, and overall labor regulations [QOG & WDI]
Trade costs/facilitation	Estimate of all costs involved in trading goods with the US [Arvis et al. (2016)]

Notes: WDI - World Development Indicators; QOG - Quality of Government; ICRG - International Country Risk Group. Higher values of exchange rate stability indicates a more stable regime. Higher values of labor market regulation indicate greater flexibility and ease of regulations in the labor market.

Table A2: ISO3 Country Codes (For Graph Reference)

ISO3 Code	Country	ISO3 Code	Country
AGO	Angola	MWI	Malawi
BEN	Benin	NAM	Namibia
BFA	Burkina Faso	NER	Niger
BWA	Botswana	NGA	Nigeria
CIV	Côte d'Ivoire	RWA	Rwanda
CMR	Cameroon	LSO	Lesotho
COG	Congo, Rep.	TGO	Togo
ETH	Ethiopia	TZA	Tanzania
GHA	Ghana	UGA	Uganda
KEN	Kenya	ZAF	South Africa
MDG	Madagascar	ZMB	Zambia
MOZ	Mozambique		

Table A3: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.
GDP	17100	54000	43	568000
GDP per capita	1510.70	2257.63	108.014	16185.90
Population	15.30	25.07	0.07	182.20
Area	396239.30	415186.30	455 13	
Weighted Distance	11797.38	2577.22	7131.3	16465.65
Time Difference	8.92	1.29	6.50	11.50
Inflation (annual%)	10.4	24.88	-8.24	325
Exchange Rate Stability	0.57	0.38	-1.08	1.92
Financial Development	20.54	27.08	0	160.13
External Debt (% of GNI)	63.65	61.11	2.06	466.79
Mobile Subscriptions (100 people)	28.41	32.93	0	160.64
Access to Telecom	20.57	19.79	0.1	90.97
Rule of Law	-0.59	0.5	-1.65	0.67
Legal & Property Rights	4.56	1.16	1.16	7.44
Transparency Index	50.37	9.47	23	75
Political Corruption	0.65	0.19	0.14	1.13
Quality of Government (ICRG)	0.4	0.09	0.22	0.61
Political Stability	-0.46	0.72	-2.41	1.13
Labor Freedom	56	13.13	32.9	91.4

Table A4: Exports of AGOA Eligible Countries (1993-2015)

Country	1993-2000	2000-2005	2006-2011	2011-2015
Angola	2596.5	4613.5	10271.6	4903.4
Benin	10.4	0.9	5	3
Burkina Faso	1.4	2.3	1.5	3.3
Botswana	22	60.1	165.2	188.7
Côte d'Ivoire	311.4	607.8	730.2	797
Cameroon	79.6	190.9	270.3	180.5
Congo, Rep.	406.5	689	2663	610.4
Ethiopia	37.5	37	92.7	166.4
Ghana	191.8	137.7	230.2	228
Kenya	107.5	250.3	264.5	371.2
Lesotho	88	358.9	294.5	249.5
Madagascar	73.7	332.1	188	154.4
Mozambique	21.6	9.3	23.2	57.7
Malawi	64.1	79.8	50.9	49.1
Namibia	35.8	115.6	208.2	151.4
Niger	7.5	19.1	77.3	16.6
Nigeria	5889.5	12813.6	24013.2	6549.4
Rwanda	4.2	4.9	13.9	26.7
Tanzania	24.9	26.9	37.9	69.5
Uganda	22.5	23.8	30.8	35.7
South Africa	2745.4	4964	6606.7	6017.7
Zambia	46.2	19.6	28	37.4
Togo	4.5	5.9	8.3	15.1

Average annual export value in millions of US$ (at a constant 2000 USD) to the US before and after AGOA. Note that various countries joined at different years, though most were eligible towards the end of 2000.

Appendix B. Selected Countries - Export Trajectory by Product Classification

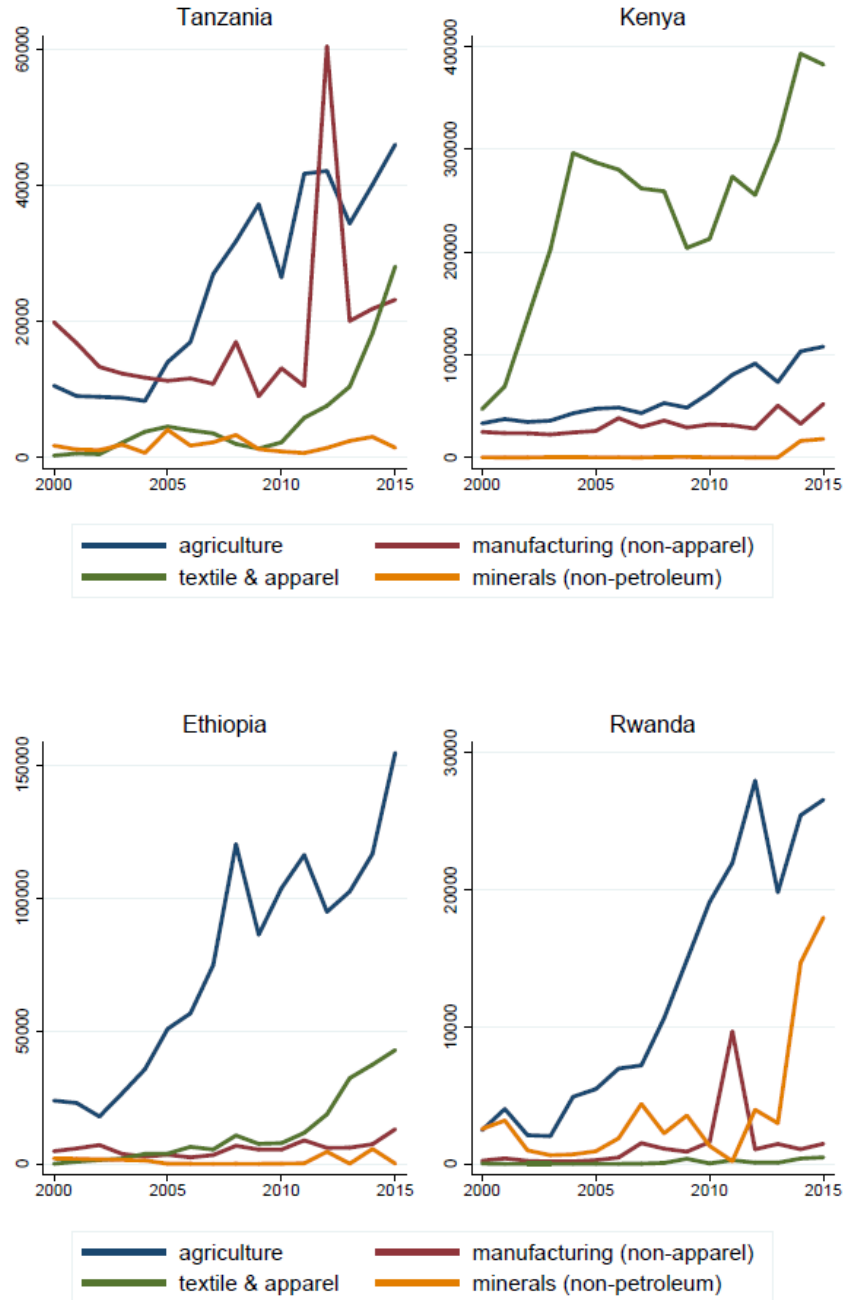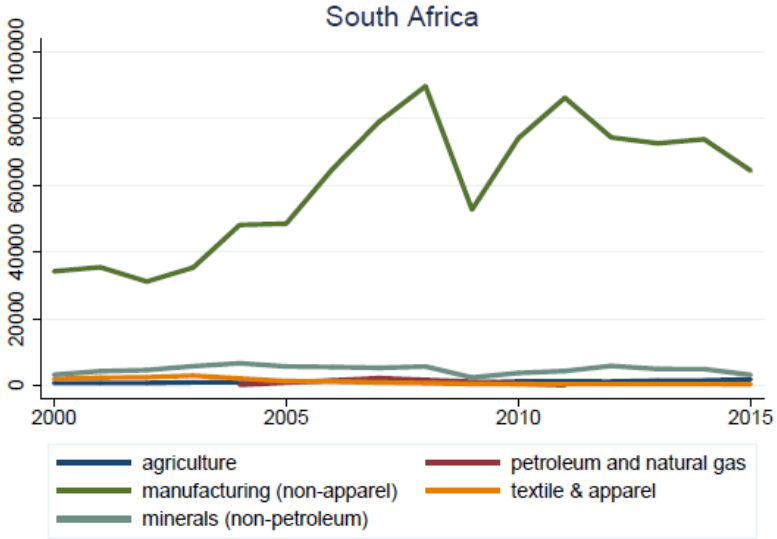*Figure A1: Selected Countries - Export Trajectory by Product Classification*

Figure A1: Selected Countries - Export Trajectories by Product Classification (Continued)

South Africa

Appendix C. Sensitivity Analysis: Determinants of Impact of AGOA

Table A5: Determinants of Export Gains Under AGOA

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inflation (annual%)	-0.061**	-0.013						
	(0.012)	(0.108)						
Exchange Rate Stability	-0.171***		-0.182***	-0.229***	-0.192***	-0.200***	-0.192***	-0.195***
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade Costs	-0.060	-0.108				0.021	0.035	0.035
	(0.713)	(0.978)				(0.973)	(0.780)	(0.651)
External Debt (% of GNI)	0.070	0.086	0.083	0.066	0.086	0.0667	0.100	0.099
	(0.747)	(0.661)	(0.599)	(0.305)	(0.482)	(0.348)	(0.191)	(0.196)
Labor Market Regulations	-0.018***	0.044***		0.021***	0.021***	0.018***	0.042***	0.044***
	(0.002)	(0.004)		(0.001)	(0.006)	(0.010)	(0.004)	(0.009)
Mobile Subscriptions (100 people)			0.208***	0.233*				
			(0.002)	(0.064)				
Legal & Property Rights		-0.0018	0.040**					-0.011
		(0.519)	(0.022)					(0.455)
Political Stability		0.111	-0.010					
		(0.951)	(0.392)					
Access to Telecom					0.226**	0.201*	0.153**	0.156**
					(0.035)	(0.062)	(0.013)	(0.010)
Political Corruption					-0.001*	-0.017		
					(0.092)	(0.147)		
Quality of Government (ICRG)				2,090.9				
				(0.727)				
Transparency Index							0.147*	0.151*
							(0.052)	(0.086)
Net Oil Exports per capita						0.064	0.101	0.099
						(0.527)	(0.340)	(0.369)
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	303	303	294	266	294	290	290	290
R-squared	0.241	0.288	0.296	0.295	0.297	0.297	0.293	0.296
F-Stat	4.133	4.133	4.133	4.133	4.133	4.133	4.133	4.133

Notes: Dependent variable is the treatment effect (gap) in terms of export/trade due to AGOA (mills. US $); p-values are in parenthesis; *** significant at 1%, ** at 5% * at 10% levels. All specifications include both country and year fixed effects. All coefficients have been standardized allowing comparison as to the relative strength of each factor. A one standard deviation increase in an independent variable is associated with a rise or fall of the trade impact by β standard deviation, where β is the value of the value of the coefficient.