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Effects of Trade Liberalization on Textile and Apparel Exports from Sub-Sahara Africa

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Abstract

This paper estimates the impact of market access liberalization in high-income countries on sub-Saharan African exports. The methodology exploits the large reduction in trade barriers that was induced by three unilateral trade liberalization initiatives: (1) the dismantling of the Multi-Fiber Arrangement, (2) the African Growth and Opportunity Act in the United States, and (3) the extension of EU trade preferences for developed countries through its Everything-but-Arms program and the General System of Preferences. Using detailed product-level information at the 6-digit level of the Harmonized System and a triple-difference empirical specification, the usual endogeneity-of-policy critique is flexibly controlled for. The results indicate strongly positive export effects, which are especially large for textile, apparel, and leather products, and tend to be realized fully within 5 years. Each percentage point reduction in import tariffs raises exports to the EU by 0.73 percent and to the United States by 0.30 percent; effects are two to three times as large for textiles. The presence of strong Chinese imports has ambiguous effects on countries' ability to take advantage of trade liberalization as the impact on the export effects to the EU and the United States show an opposite sign.

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JEL codes: N67, L67, F14, F13

1. Introduction

Given today's sophisticated global production networks, it is quite challenging for firms from developing countries to integrate in global value chains (GVC). Product standards tend to be very high and firms need advanced logistical capabilities to interact with other links in these chains. Whittaker et al. (2010) emphasize that the policy support that is required along a variety of dimensions is likely to exceed the capabilities of all but the most effective governments. This is particular challenging when the objective is to boost manufacturing employment in economies in sub-Saharan Africa.

In terms of policy support that developed countries can provide, facilitating access for goods exported from developing countries to their own markets is one of the most straightforward policy propositions. We can ask, however, what the potential impact is of such a simple and isolated policy. Several constraints could limit the potential benefits, but we can lump them in two groups. On the one hand, room for growth might be limited because current exports already fill most of the import demand. On the other hand, African firms might face important domestic barriers that prevent them from taking advantage of export opportunities when they present themselves. Our analysis will address both of the these concerns.

Light manufacturing industries, especially labor-intensive production of textile and apparel products, are prime examples of the type of industries in which developing countries have a natural comparative advantage. Production initially can take place at home or in small workplaces, while more centralized and larger factories become important once firms export more and need to improve product quality. This is also an industry where many aspects of GVCs, including entry barriers faced by new producers, have been studied extensively. For example, Gereffi (1999) highlighted the unique function of lead buying firms in expanding production in developing countries.

Moreover, quality upgrading is a pervasive phenomenon in the textile industry as the number of sub-segments is vast. It provides exporters with incentives to upgrade their capabilities which can allow them to break into more profitable segments or to retain themselves a larger share of total value created in the chain. Extensive product differentiation also allows for the co-existence of firms of different levels of development in the same GVC. Finally, rules-of-origin restrictions that often accompany the preferential market access granted to some countries also play an important role in the organization of the sector and its uneven development around the world. In all, the textile sector is an ideal sector to study the potential for industrialization through GVC integration.

In the process of the industrial development of many countries that are now high or medium-high income, the textile sector has often provided an initiating role (Vogel 1991). This has been true for several countries that by now have moved beyond textiles and successfully export more sophisticated products. The potential for the textile industry to spur industrial development has been subdued for several decades. Under the Multi-Fiber Arrangement (MFA), import quotas in the markets of developing countries locked historical production shares in place. The abolishment of all quotas by 2005 has restored the industry's potential to jump-start industrialization. Right now, there is no product category where the least developed economies have a higher export share than in textile and apparel.

In order to identify and quantify the magnitude of the causal effect of market access liberalization on exports, we need to observe exogenous variation in trade barriers. The apparel and textile sectors have undergone a particularly wide-ranging set of trade liberalizing reforms over the last two decades. In particular, we will exploit two unilateral initiatives that were implemented without requiring trade concessions from African countries and which can be considered exogenous policy changes from these countries' perspective. Since 2001, the EU has made its General System of Preferences (GSP) that confers unique market access advantages to poor countries a lot more generous. In particular, its Everything-but-Arms program eliminated virtually all tariffs and quotas for the least developed countries. In the United States, the African Growth and Opportunity Act (AGOA) that was passed in 2000 provides similar benefits specifically for African exporters. This initiative is especially generous (in relative terms) for apparel imports. The gradual relaxation of import quotas when the MFA was phased out under the Agreement of Textile and Clothing (ATC) made it possible for the two market access liberalizations to translate into much higher exports from African countries to these two developed markets.

An important benefit of exploiting these particular policy changes is that detailed information is observed on the liberalization process. Moreover, the trade liberalization was applied selectively on both the country and product dimension. Not all developing countries qualified for each scheme and eligible countries did not all benefit to the same extent or started benefitting at the same time. The same uneven liberalization occurred at the product level. As a result, we can rely on two alternative triple-difference estimation strategies that exploit the variation in policy changes across countries and products.

While reverse causation is not much of a concern in these cases, as policy changes were unilaterally initiated by the developed countries, our estimation strategy is particularly robust to the type of policy endogeneity concerns raised in Besley and Case (2000). Moreover, the inclusion of three sets of flexible interaction fixed effects—at the exporter-product, exporter-year, and product-year dimensions—makes sure that omitted variables and misattribution problems, as raised in Rodrik, Subramanian and Trebbi (2004), are properly dealt with. In all, it is an ideal setting to evaluate the effectiveness of a change in trade policy.

While the main objective is to quantify the potential for higher exports caused by improved market access, we additionally control for the rise of China. In the last decades, the globalization process has affected the economies of South and South-East Asia a lot more than in Africa. As a result, exports from those regions have boomed, also in the textile and apparel industries, and African firms increasingly compete directly with Asian producers (Kaplinsky and Morris, 2008). The fact that growing exports from Asia increases competition on the EU and US markets also targeted by African exporters, is already absorbed in the product-year interaction fixed effects that we include as controls. However, exports of the Asian countries, and in particular of China, to the African countries themselves have also increased. Because increased domestic imports might affect the local industry and firms' export incentives and ability, see for example Frazer (2008), we will incorporate Chinese imports to Africa explicitly in our estimation framework.

In sum, the contributions we make in this paper are four-fold. First, we illustrate that the potential for export-driven growth in the textile sectors of sub-Saharan Africa is substantial and relatively unexploited. Second, we propose two identification methods that can be used to

identify the causal effect on exports in response to previous policy changes. Both methods have their own advantages and disadvantages and, hence, provide complementary evidence. Third, we exploit the relatively recent market access liberalization for African exports to the EU, through the expansion of the various GSP schemes, and to the United States, following the implementation of AGOA. Our estimates will quantify the magnitude of the export elasticity with respect to full or partial trade liberalization and the extent to which these elasticities vary across product categories. Fourth, we summarize the remaining market barriers for textile and apparel exports that African countries face on EU and US markets. Together with the estimated elasticities this will provide a sense of how much potential for output growth through further market access liberalization remains.

The remainder of the paper is organized as follows. In Section 2 we provide some supporting evidence on the initial industrialization potential of textiles and apparel exports and the relative performance of sub-Saharan Africa. In Section 3, we provide an overview of the two market access liberalization episodes that we exploit to estimate the potential export response. In Section 4 we describe our empirical framework and the logic behind the identification, followed by a description of the data in Section 5. In Section 6 we discuss the estimation results and in the concluding Section 7 we address a few caveats, and we draw implications for the remaining growth potential through the removal of remaining trade barriers.

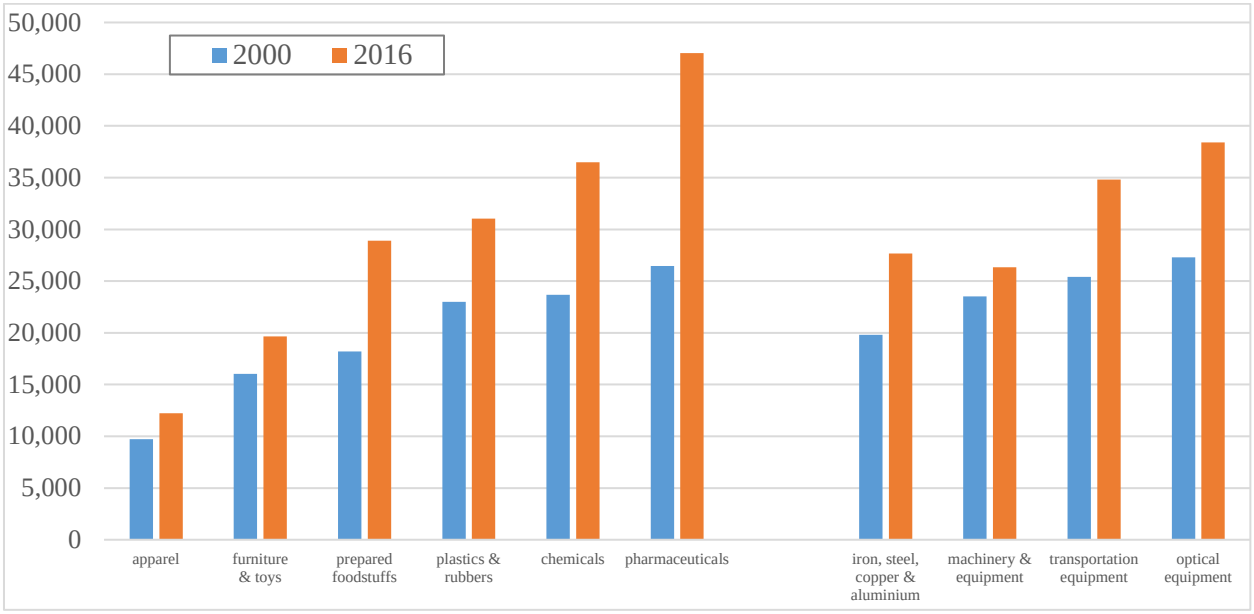
2. Focus on textile and apparel industry

One reason it is interesting to focus on the benefits of improved market access in textile and apparel is that the many aspects of the value chain of this industry has already been investigated through case studies. Starting with Gereffi (1999), many authors in the GVC literature have mapped the role of suppliers in developing countries in the global textile industry and the barriers they face to integration in the global production network. That work draws mostly on case studies and is supplemented by firm surveys in several countries.

The web site www.globalvaluechains.org is a depository for work on GVCs and it contains 74 studies focusing specifically on African countries and 220 studies on the textile and apparel industries. Twelve studies are exactly at the intersection of textiles & apparel industry in Africa and there are three more studies that investigate the footwear & leather industries in Africa. The evidence in Gibbon (2003) illustrates how detailed information from specific industries in a few countries can supplement the type of cross-country evidence that we will present here.

A second reason for our interest in studying GVCs in textiles and apparel is that this industry is a common entry point into the global manufacturing industry for less developed countries (Vogel 1991). Developing countries often have a comparative advantage in labor-intensive, light manufacturing of which textile is a prime example. This was true historically, but is still supported by current data. In Figure 1, we show the average GDP per capita across all exporters for different product categories. Importantly, we use each country's export market share in global trade for the product category as weight. When most exports of a particular commodity originate from relatively poor countries, the product category will show a low average GDP per capita. This approach was used by Hausmann, Hwang and Rodrik (2007) to construct their widely-used PRODY measure of product quality.

Figure 1: Average GDP/capita of exporters by product category (export share-weighted)



Notes: Export share-weighted average GDP per capita across all (global) exporters in a product category. Values are in current USD.

The blue bars in Figure 1 show the average GDP per capita of exporters based on country-level GDP per capita and global export shares for 2000. The orange bars show the results from the same calculations for 2016. We selected a number of products from two broad categories, namely light manufacturing and metal-based industries, and ranked them by rising "quality". By separating the two groups, it becomes clear that the ranking of different products is stable over time. In only a single instance would products have reversed position between 2000 and 2016.[1]

The ordering of most industries is intuitive. Pharmaceutical products and optical equipment are exported mostly by highly developed countries. Plastics & rubber and machinery & equipment are intermediate. At the very bottom of the scale, on the far left in Figure 1, sits apparel. The average apparel exporter hails from a country with a GDP per capita of less than 10,000 USD (in international PPP) in 2000. This is less than 40% of the income level for the country where the median exporter of pharmaceuticals or optical equipment is located. Moreover, the average income level of apparel producers increased the least between 2000 and 2016 of all products that we show.[2] In 2016, apparel exports are still dominated by the poorest countries and the income gap with countries exporting pharmaceuticals has grown to a 1-to-4 difference. We calculated this average GDP per capita for a large set of products, more than could be shown in Figure 1, and apparel was at the very bottom of the entire range. Even agricultural products and animal exports tend to come from slightly wealthier countries.

[1] In 2016, countries exporting machinery & equipment tend to have a slightly lower GDP per capita than countries exporting metal inputs, "iron, steel, copper, & aluminium". In 2000 that was not the case.

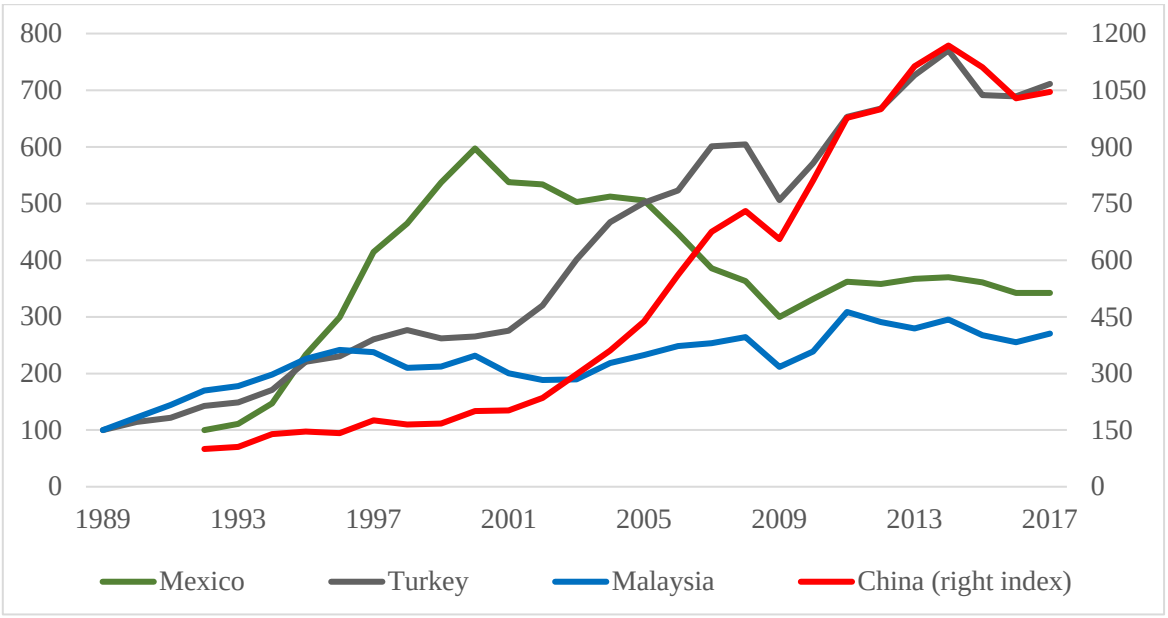
[2] Of course, this does not necessarily imply that countries exporting apparel see low income growth as the set of countries that are important apparel exporters changes over time.

Many countries that started their industrialization process as exporters of textile and apparel products, subsequently diversified into different sectors that offered more development potential. Over time, as they overcame transaction costs to serve international markets and as the capabilities of domestic firms deepened, countries tend to transition and gradually specialize in more sophisticated sectors. This upgrading patterns has many dimensions, as discussed in Van Assche and Van Biesebroeck (2018). Industrial upgrading, moving activities from less to more sophisticated industries, is one such aspect and there is weak evidence that it coincides with functional upgrading, meaning that domestic firms become responsible for a broader range of activities.

In Figure 2 we show the evolution of textile exports for four countries that have already completed more of a development trajectory than any country in sub-Saharan Africa. In each case we see textile exports accelerating sharply, but after some years export growth tailors off. At that point these countries started to experience export success in products where they are able to capture more value added domestically.

In the case of Mexico, the growth in textile exports after the NAFTA agreement came into effect in 1994 was extremely fast. But Mexican textile exports declined quickly once its firms started to integrate in the North American production structure performing activities where timely delivery of inputs was highly valuable, as in the automotive industry (Sturgeon, Van Biesebroeck and Gereffi, 2008). Similarly, textile exports from Malaysia grew by 150% between 1988 and 1996, but subsequently its manufacturing sector shifted focus to production of electronic equipment. Growth in textile exports from Turkey and China was also very rapid, but only took off as quotas were relaxed in the gradual elimination of the MFA, mostly between 2001 and 2005. Subsequently, their manufacturing sectors also oriented away from textiles and by 2012 growth in textile exports also stalled for these countries.

Figure 2: Evolution of total exports of textiles and apparel (first year = 100)



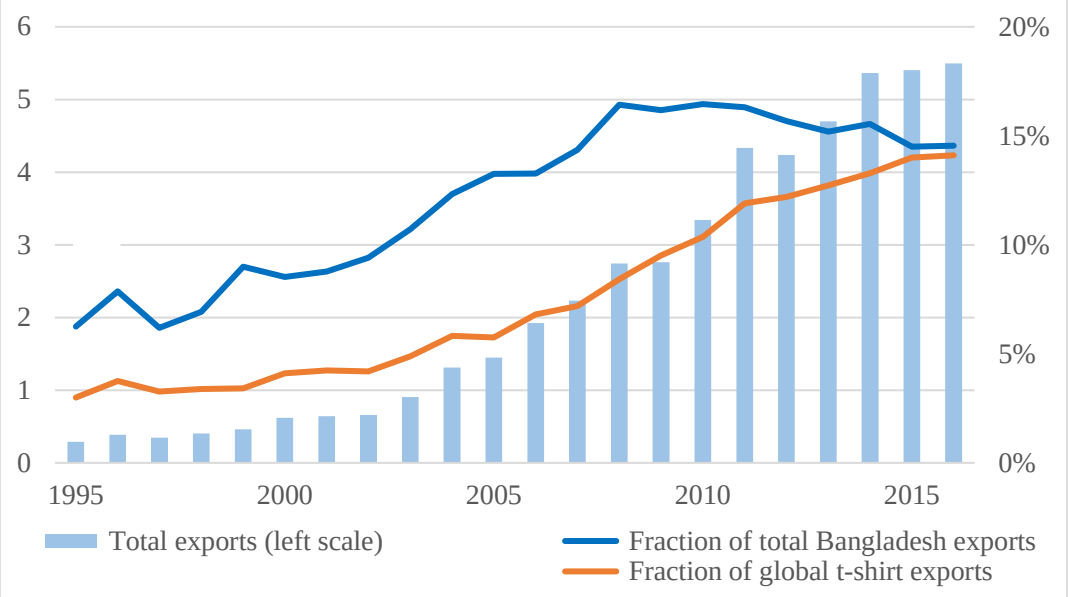
Source: Calculations based on data from UN Comtrade. Nominal export growth rate in current USD. All indices are normalized at 100 in the first year shown. Values for the first three countries are shown on the left scale and for China on the right scale.

As long as quotas existed under the MFA, poor developing countries were limited in their ability to use textile exports as a means to jumpstart the development of their light manufacturing sector. Import quotas for textiles and apparel in developed markets were based on historical export volumes and were only increased gradually as a country achieved export success. This constraint was relaxed when quotas were gradually abolished over a transition period. The entire quota system was abolished by 2005.

The more recent experience of the Bangladeshi textile sector highlights the rapid growth in exports that is currently possible, now that historical quota constraints are no longer an issue. In Figure 3 we show the country's experience with exports of t-shirts which was a particular success story. It took eight years, from 1995 to 2003, for Bangladesh approximately double its exports from 289 million USD to 661 million USD.[3] Over a similar time span, from 2003 to 2009, but simultaneously with the total elimination of the MFA quota system, its exports quadrupled to 2.8 billion USD. By a mere five years later, its exports had almost doubled again and total t-shirt exports stood at 5.4 billion USD in 2014.

Over this time period, the share of Bangladeshi exports of t-shirts grew from 1% of global trade to 14% (orange line). Given that there are natural limits to this share, as industries in different countries specialize in different market segments defined by quality, material, and fashion cycles, it is not surprising that its market share levelled off towards the end. Equally important, as shown by the dark blue line in Figure 3, is that the fraction that t-shirts represent in Bangladeshi total exports peaked already in 2008 and started to decline gradually. Given that t-shirt exports kept increasing, it implies that exports from other industries must have been rising even more rapidly. This example nicely illustrates what is possible in terms of export growth and subsequent industrial upgrading if market access is liberalized.

Figure 3: Exports of T-shirts from Bangladesh



Note: Total exports on the left scale is measured in nominal values (current USD, billions). Both fraction on the right scale are calculated from nominal values (current USD) within the year.

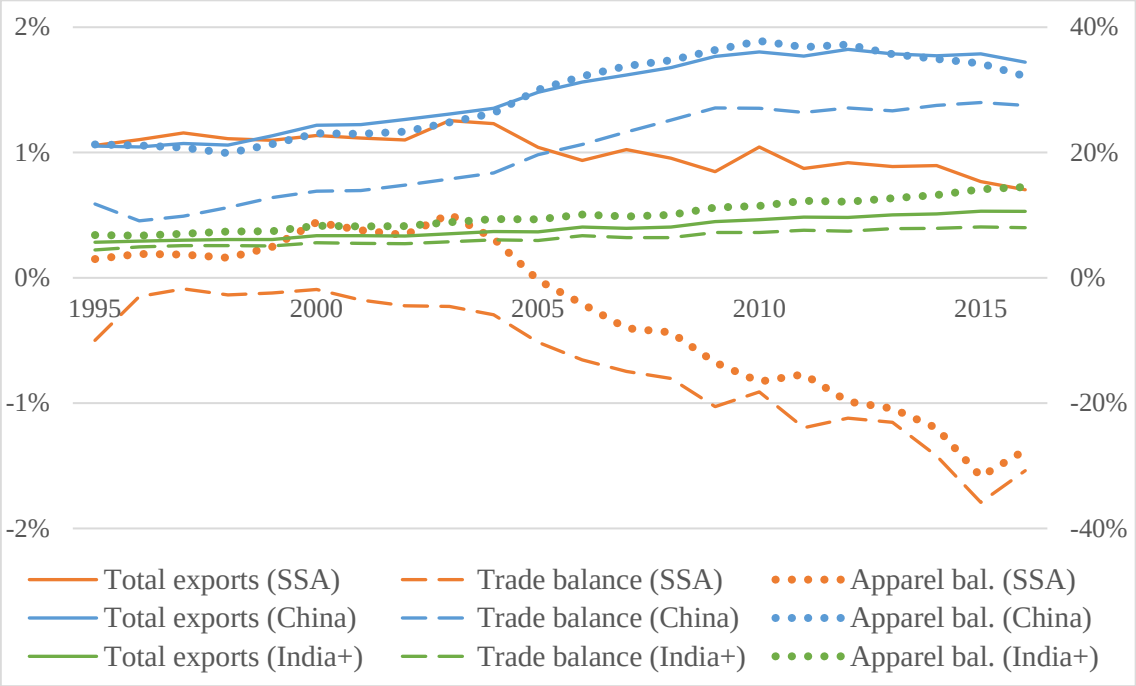
[3] This growth rate probably even overstates the real growth somewhat as the statistics refer to nominal values.

The evolutions in Figure 4 for the entire textile industry and for apparel in particular, show that the experience of Bangladesh is mirrored in the overall export success of China and the entire South Asian region, but does not extend to sub-Saharan Africa. The graph shows a lot of lines, but the most important feature is they are trending up for China (in blue) and for South Asia (in green), but not for sub-Saharan Africa (in orange).

The share of global exports in textiles—summing over five segments of the textile industry[4]—for sub-Saharan Africa was only 1% in 1995. This fraction rose slightly to 1.2% by 2004, but subsequently it declined and the region ended the sample period in 2016 with a share of global textile exports of only 0.7%. The evolution was markedly different for China and South Asia (India+) which both saw their exports almost double as a share of global trade in this sector (shown on the right scale). As these two regions developed their textile sectors, they took away market share from more advanced countries, which in turn specialized in more advanced products than textiles. The combined market share of China and South Asia in textile exports grew from 27% to 45% over two decades.

It is not the case that this export increase in China and South Asia was merely a by-product of these regions' rapid development over this period. Textile imports also increased, but that growth rate was much more subdued. As a result, their net trade balance in the textile sector evolved very favourably, at least from the perspective of boosting local industrialization. In China, it grew from a surplus of +9% in 1996 to a surplus of +28% in 2016. In South Asia, the net trade surplus doubled from +4% to +8% over the same 20-year period.

Figure 4: Evolution of exports and the trade balance for the broad textile industry in 3 regions



Note: All fractions and growth rates are calculated from nominal values in current USD. Total exports sum over five product categories in the textile industry and is expressed as a fraction of global trade. The trade balance subtracts total imports from exports. The apparel balance shows net exports limited to apparel products (the

[4] The five segments of the textile industry: agri-inputs, textile equipment, textile, apparel, leather & footwear.

largest category in the broader textile sector). The three regions are sub-Saharan Africa (SSA), for which statistics are shown on the left scale, China (including Hong Kong and Macau), and South Asia (India+), which comprises India, Pakistan, Bangladesh, and Sri Lanka.

While both of these evolutions are already highly positive, we should emphasize that they happened in the context of rapidly rising world trade in textile products. The absolute growth of textile exports in these countries is even more rapid than the statistics in Figure 4 suggest, given that the increase in their market share is calculated on a rising total trade. Over all five textile industries that we combined in the total, global exports grew by 115% over the sample period, or 3.7% cumulatively per year.

Global export growth was particularly rapid for the most labor intensive category of apparel products. Global apparel trade grew by 165%, or 4.8% per year. The dotted lines in Figure 4 highlight that the two rapidly developing regions performed particularly strongly for apparel exports. Especially for South Asia, the lesser developed of the two regions, net exports of apparel grew very fast and the region attained a positive balance of +14%, expressed as a share of global apparel trade.

For the sub-Saharan region, apparel exports evolved somewhat more positively than in the other product categories, but the difference is not huge. Between 1995 and 2003, apparel exported from Africa captured a higher share of global trade and the region recorded a net trade balance that rose from +0.1% to +0.5% of global apparel trade. However, in the next 13 years, apparel exports from sub-Saharan Africa did not keep pace with apparel imports and by 2016 the trade deficit was similar as for the broad textile sector.

3. Overview of three trade liberalization episodes

3.1 The African Growth and Opportunity Act

To estimate the responsiveness of African exports to market access liberalization, we exploit two policy changes. The first one is the African Growth and Opportunity Act (AGOA) which was passed by the United States in 2000. It unilaterally granted duty-free and tariff-free access to the U.S. market to the majority of sub-Saharan African countries.[5] When the Act was first implemented on October 2, 2000, it applied to 34 countries. By January 2, 2008, eight more countries had been added to the list, often after government stability was achieved, such as in Sierra Leone. Four countries, the Central African Republic, Eritrea, Côte d'Ivoire, and Mauritania have been removed from AGOA as a result of failures regarding political or democratic freedoms, but all returned to the list of eligible countries by the end of 2017.[6]

[5] The main criteria for AGOA eligibility relate to a basic level of political and democratic freedom within the country.

[6] The Central African Republic (January 1, 2004) and Mauritania (January 1, 2007) were both removed after coups. While Mauritania re-joined on December 23, 2009, the Central African Republic only did so on December 15, 2016. Eritrea (January 1, 2004) was removed after failing to implement elections and democratic reforms and re-acquired eligibility on December 15, 2016. Côte d'Ivoire (January 1, 2005) was removed after

The US trade concessions were uniform across all countries eligible for AGOA, but differed for apparel and non-apparel items. For non-apparel, approximately 1,800 items were added to the list of products with zero import duty under the existing Generalized System of Preferences (GSP). As a result, for AGOA countries the number of goods on the US GSP list expanded from 4,600 to more than 6,400 items, defined using the 8-digit HS (Harmonized System) product classification . We will refer to these newly added items as GSP products, for brevity.[7] As soon as a country is declared AGOA eligible, it can export any of these items duty-free to the United States.

For apparel, duty-free access to the US market for exports of an African country is not automatic when AGOA-eligibility is granted. Countries needed to be specifically declared to be eligible for the 'apparel provision'; the first ones were Kenya and Mauritius on January 18, 2001, three months after most countries were admitted to AGOA proper. Countries have been 'admitted' to the apparel provision at various times over the subsequent years. The apparel provision allows for duty-free and, importantly, also quota-free access to the US market for most apparel products, provided that the fabric (or yarn or thread) comes either from the Unites States or from an AGOA country. While the country-level quotas have been removed, a regional (AGOA) quota remains for apparel that was initially set at 1.5% of U.S. imports, but was increased 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 general admission to AGOA, countries seeking access to the apparel provision must prove 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 was designed for 'lesser developed' AGOA countries, and allows them to source their fabric or yarn from anywhere in the world.[8]

While the set of products that benefitted from the trade liberalization (eligible products) was uniform across eligible countries, it was not comprehensive. AGOA applied selectively to both countries and products, but not to all countries, nor to all products. This feature allows us to estimate the effects of the Act on export performance very flexibly using a triple difference-in-differences approach that is discussed in greater detail below. The results we present extend the estimates of Frazer and Van Biesebroeck (2010) to the more recent period. We also use a second identification strategy to verify the robustness of the earlier estimates.

Gibbon (2003) confirms the significant supply response found in Frazer and Van Biesebroeck (2010), for the clothing sector in particular. He emphasizes, however, that not all

failing to implement a peace plan and re-entered in October 2011. As of December 22, 2017, the following countries were still excluded from AGOA: Zimbabwe, Somalia, Sudan, South Sudan, the DRC, Equatorial Guinea, Mayotte and Togo.

[7] Note, however, that there are an additional 4,600 products on the GSP list for which nothing changed after 2000. In our estimation strategy, the inclusion of both country-product and product-year interaction fixed effects implies that products already on the GSP list (for which market access did not change) will not contribute to the estimation of the export elasticity of interest.

[8] In practice, this is defined as having a per capita GNP below $1500 in 1998, as measured by the World Bank. During our sample period, South Africa was the only country ever eligible for the apparel provision that did not qualify for the special rule (either by rule or exception granted).

enterprises benefited to the same extent. Far-Eastern owned enterprises, i.e. not locally owned ones, are responsible for the bulk of the supply increase. An even more in-depth study of the impact of AGOA on the clothing manufacturing sector in Kenya, in Phelps, Stillwell and Wanjiru (2009), provides evidence of strong direct employment effects, but weak indirect development effects. A segment of the local industry has developed that takes advantage of preferential US market access, but is dominated by MNEs. Backward integration between these successful exporters and the rest of the local economy is very limited.

Rotunno, Vézina and Wang (2013) argue that some of the success of AGOA in raising African exports to the United States was linked to the imposition of import barriers in the United States for China imports after the MFA ended. They provide suggestive evidence that some African exports merely represent transshipments of Chinese exports to Africa, with some firms exploit AGOA countries as export platforms to take advantage of quota exemptions. Naturally, this type of activity is not durable and contributes little to local development. They estimate that it accounts for one fifth of the increase in African exports.

3.2 The EU's Everything but Arms and Generalized System of Preferences programs

The second market access liberalization that we exploit is the expansion of preferential access to the EU market for developing countries under the GSP. Non-reciprocal preferential access via the GSP has been granted by the EU to most developing countries since 1973. Its objective is to encourage exports from beneficiary countries by providing their exporters with a competitive advantage *vis-a-vis* exports from other countries, and thereby stimulating economic activity in those beneficiary countries.

Today, the EU's GSP includes the GSP General Arrangement, the GSP+, a special incentive scheme for sustainable development and good governance designed for vulnerable countries, and the *Everything But Arms* (EBA) scheme, which allows all exports except arms and ammunition from the group of Least Developed Countries (LDCs) completely duty-free access to the EU market. Full details on the history and scope of the GSP are provided in the Appendix. The most important features that determine the generosity of the three schemes are as follows:[9]

1. The GSP General Arrangement

This is the standard scheme in the GSP program. With the introduction of the new GSP scheme in 2005, its product coverage was increased from 6,900 to 7,200 tariff lines, mostly in the agricultural and fishery sectors, maintaining existing preference margins, i.e. tariff reductions relative to Most-Favorite Nation (MFN) rates. Of the total 10,300 tariff lines in the EU‘s Common Customs Tariff, roughly 2,100 products have an MFN duty rate of zero and tariff preferences are not relevant for these. Of the remaining 8,200 products, GSP covers approximately 7,000, of which about 3,300 are classified as non-sensitive and 3,700 as

[9] This description draws on Thelle et al. (2005).

sensitive. Non-sensitive products have duty-free access and sensitive products benefit from a tariff reduction. The non-sensitive category covers most manufactured products, but excludes some important labor intensive and processed primary products such as textiles, clothing and footwear. Most of the dutiable tariff lines excluded from the GSP are agricultural products covered by the EU‘s Common Agriculture Policy.[10]

2. The GSP+

The GSP+ is a special incentive arrangement for sustainable development and good governance designed for vulnerable countries. It provides deeper tariff preferences—essentially duty-free access on all tariff lines where the duty is solely an ad-valorem or specific tariff and the removal of the ad-valorem element in the case of a mixed tariff—for the 7,200 tariff lines covered by the GSP, but only if beneficiary countries meet a number of criteria and effective application of 27 international conventions on human and labor rights, environmental protection, fight against drugs, and good governance. To benefit from GSP+, countries must demonstrate that their economies are poorly diversified, small, lower-income economies, land-locked states or small island nations, and therefore dependent and vulnerable. Poor diversification and dependence means that the five largest sections of a country’s GSP-covered imports to the EU must represent more than 75% of its total GSP-covered imports. In addition, GSP-covered imports from that country must represent less than 1% of total EU imports under GSP.

3. Everything but Arms

Everything But Arms is a special GSP arrangement for the Least Developed Countries, introduced in 2001. The scheme allows duty free access into the EU market for all products except arms and ammunition. Only imports of fresh bananas, rice and sugar were not fully liberalized immediately. Duties on those products were gradually reduced and duty free access was granted for bananas in January 2006, for sugar in July 2009 and for rice in September 2009. The EBA Regulation foresees that the special arrangements for LDCs should be maintained for an unlimited period of time and not be subject to the periodic renewal of the Community's other GSP schemes.

The GSP provides eligible exporters with a competitive advantage *vis-à-vis* other exporters, and provides scope for an enhanced export performance. The extent to which this will actually occur depends on the size of the preferential tariff margins granted and the ability of the intended beneficiaries to take advantage of the preferences offered. The economic impact of the preferential regimes is therefore an empirical question.[11]

Crucially, the effect on exports will depend on the size of the preferential tariff margin, which is determined by the generosity relative to the tariff applied to non-beneficiaries of the scheme. As EU trade barriers are progressively lowered via both the multilateral system and other regional or bilateral Free Trade Agreements, the value of preferences may thus diminish over time, giving rise to ‘preference erosion’. In the empirical work we will each year

[10] Among the tariff lines not covered by the GSP, some also fall into HS chapter 93, arms and ammunition.

[11] There is surprisingly little empirical work evaluating the effects of the GSP. In the case of the EU’s system, one early exception is Panagariya (2002).

measure the magnitude of the preferences at the product-country level by the percentage point difference between the MFN tariff and the best-available tariff under either of the three schemes of the EU's GSP.

Given that the GSP and the market preferences for African, Caribbean, and Pacific (ACP) countries have been in existence for a relatively long time, it would be difficult to identify its effects comparing export volumes pre and post the introduction of the regimes. The world economy has changed too much to draw inferences from the change in exports from the pre-1973, pre-GSP export volumes to today. Instead, Thelle et al. (2015) generalized the triple-difference approach of Frazer and Van Biesebroeck (2010) by exploiting the exact magnitude of the trade preference given for different country-product observations at each point in time.

3.3 Multi-Fiber Arrangement and the Agreement on Textile and Clothing[12]

The Multi-Fiber Arrangement (MFA) grew out of a series of voluntary export restraints imposed, initially, by the United States on Japanese textile exports in 1955. By the end of the 1950s, the United Kingdom also started to limit imports from Hong Kong, India, and Pakistan. Quotas on cotton textiles and apparel products were first institutionalized with the Short-Term Arrangement in 1961, which was extended to two subsequent Long-Term Arrangements throughout the 1960s and early 1970s. As the Asian economies' textile and apparel production continued to grow, developed countries instated the MFA in 1974 to deal with "market disruptions" in other fiber markets. As a result, textile and clothing products were kept out of multilateral trade negotiations under the General Agreement on Tariffs and Trade (GATT) and its successor, the World Trade Organization (WTO).

The Agreement on Textile and Clothing (ATC) was part of the Uruguay Round, which was concluded in 1994. The ATC ended the MFA and began the process of integrating textile and clothing products into GATT/WTO rules by removing their quotas. Integration occurred over four phases that gradually ended quotas applied to all four major textile and clothing segments, that is, yarn, fabrics, made-up textile products (e.g., table linen, carpets, and curtains), and clothing. On January 1, 2005, Phase IV abolished the remaining quotas, which still covered 49% of export volumes at that time.[13] In addition to gradually removing quotas, the ATC improved developing countries' access to developed- country markets by accelerating quota growth over the four phases of quota removal.

The evolution of textile exports in Figure 4 already illustrated that over the last two decades, China became the dominant textile exporter in the world. It only started to benefit from the ATC quota removals after it entered the WTO at the end of 2001. China received all quota removals of the first three phases of the ATC simultaneously at the start of phase III on January 1, 2002. When it joined the WTO, China also agreed to a special safeguard on its textile and apparel exports. Under this safeguard mechanism, if a WTO member felt that textile and apparel imports from China threatened to "impede the orderly development of

[12] This discussion draws on Harrigan and Barrows (2009) and Brambilla, Khandelwal and Schott (2010).

[13] Developed countries back-loaded the removal of quotas on "sensitive" products to the final phase. In the initial phases, they included many products not subject to quotas in many countries or products for which quotas were not binding.

trade in these products," it could request that China limit its exports to that country, generally for no more than one year. If consultations did not lead to a different solution, China would agree to hold its exports of the given product "to a level no greater than 7.5 per cent (6 per cent for wool product categories) above the amount entered during the first 12 months of the most recent 14 months preceding the month in which the request for consultations was made." This safeguard mechanism remained in place until December 31, 2008.

For our empirical analysis, the trade liberalization under the ATC is only of secondary importance as product-year fixed effects will capture the exporting boosting effects to the extent that they affect all countries alike. It will however, lead to preference erosion for the countries that already received quota-free market access prior to the scheduled removals under the ATC. Our expectation is that it will bias the estimates that we obtain downward, as it overestimates the market access advantage for countries benefiting from AGOA and GSP relative to the control countries, especially after 2005.[14]

4. Empirical framework

4.1 Causal inference using triple difference estimation

The objective of the empirical analysis is straightforward. We want to estimate the effect of market access on export performance. Denote the explanatory variable, for example the level of import tariffs or duty-free access status under a Free Trade Agreement, by X_{it}. The double subscript refers to observation *i* in year *t*. The dependent variable y_{it} measures some dimension of export success, e.g. export flows from country *i* to a benchmark country (EU or United States) or export status in that market. For now, we only include export flows to a single destination in the regression. We will estimate a performance equation of the form

$$y_{it} = \alpha + \beta X_{it} + Z'_{it}\gamma + \epsilon_{it}. \quad (1)$$

We are only interested in the coefficient β which measures the effectiveness of market access in raising exports. To give this coefficient a causal interpretation we face two main problems. First, there can be simultaneity as the level of market access varies not independently from the error term in the performance regression. Policy endogeneity, whereby policymakers adjust their policies taking into account the state of the economy, is often a concern (Besley and Case, 2000). Second, the market access variable of interest might merely be correlated with an omitted variable that is the true reason for strong or weak export performance. In equation (1) we included a vector of control variables Z', but if this list is incomplete, we face a misattribution problem. The literature trying to distinguish the independent roles of institutions and trade on the growth process provides a famous example of the difficulty of making causal inference at the country level when explanatory variables are intrinsically interrelated (Rodrik, Subramanian and Trebbi, 2004).

A common way to address both challenges is to estimate a difference-in-differences model

[14] We are in the process of collecting the necessary data to control explicitly for the ATC liberalization.

$$y_{it} = \beta X_t I_i + Z'_{it}\gamma + \gamma_t + \gamma_i + \epsilon_{it}, \quad (2)$$

which simply adds observation-fixed and time-fixed effects. To illustrate the logic behind this identification method, we have re-written the policy variable X_{it} as a product of two variables, $X_t * I_i$.

Before generalizing this approach further, it is useful to make the reasoning why it helps causal identification explicit. The first variable X_t measures the market access advantage, e.g. a tariff preference or merely a dummy for treatment status, that the policy confers to observations which are 'treated'. We can normalize this to zero in the pre-treatment period, in which case the original constant term α captures the average expected performance across all observations.[15] The extent of treatment for a subset of observations is then captured by X_t which might even vary over the post-treatment period or across treated observations if we add another dimension of heterogeneity. The second variable I_i indicates the treatment status of an observation. In the pre-treatment period this will have no effect as $X_t * I_i$ equals zero for all observations. In the post-treatment period the product remains zero for control observations, but equals X_t for treated observations.

Taking the difference of equation (2) and the same equation one period lagged, removes the observation-fixed effects:

$$\Delta y_{it} = \beta X_t I_i + \Delta Z'_{it}\gamma + \Delta\gamma_t + \Delta\epsilon_{it} \quad (3)$$

The dependent variable is now export growth, and it is explained by the policy change for treated observations, the change in time-varying control variables, and a time fixed effect that captures the shocks to the economic environment that affect treated and control observations in the same way. Finally, we can take an additional difference between equation (3) for treated and the comparable equation for control observations, which leads to an equation that contains only observables and a residual

$$(\Delta y_{it} - \Delta y_{ct}) = \beta X_t + (\Delta Z'_{it} - \Delta Z'_{ct})\gamma + \tilde{\epsilon}_{it}. \quad (4)$$

The new residual is a function of the original residuals of equation (1). If these are i.i.d., the composite residual will be i.i.d. as well and we denote it by $\tilde{\epsilon}_{it}$.

Equation (4) highlights that the parameter of interest β equals the average difference in export growth for treated and control observations, after accounting for differential changes in the control variables. A benefit of recovering this parameter from the fixed effects specification (2) is that there is no need to collect information on variables that do not change over time or information on environment variables at any given time that affect the performance of all observations in the same way. The observation and time-fixed effects flexibly control for any effects on performance that only vary along one of the two dimensions *i* or *t*. We only need to collect information on control variables that vary along both dimensions.

This approach has been widely used to evaluate the impact of trade policy on trade flows, see for example Baier and Bergstrand (2007), or in the estimation of gravity models more

[15] In the more general specification (2), the benchmark value of y_{it} is subsumed in the fixed effects.

generally, see Head and Mayer (2014). A remaining problem is to include all relevant control variables to capture differential evolutions in the economic environment of treatment and control observations. This problem can be overcome by generalizing the approach to include a third dimension.

One can estimate equation (2) using a difference-in-differences analysis at the country level by comparing export growth for countries that do or do not benefit from liberalized market access. Alternatively, if only a subset of products benefit from the trade liberalization, one can compare export growth for treated and control products only for eligible countries. If not all countries in the sample are treated and not all products in treated countries benefit from the trade liberalization, we can estimate the following specification:

$$y_{ipt} = \beta X_t I_{ip} + Z'_{ipt}\gamma + \gamma_{cp} + \gamma_{ct} + \gamma_{pt} + \epsilon_{ipt}. \quad (5)$$

The subscript *i* is replaced by the country-product subscript *ip*, and all possible double-interaction fixed effects are included as controls. In principle, we can still include control variables *Z*, but in practice it is hard to obtain any variables that vary at the country-product-year level. The key indicator variable I_{ip} captures whether product *p* from country *i* benefits from improved market access in the post-treatment period. If this set of products is the same in each treated country, it can be written as $I_i * I_p$, but it is not necessary.

There are two ways to understand the intuition behind the identification of the coefficient of interest β in specification (5). Abstracting from the control variables and assuming the market access improvement is equally large for each treated country-product observation, the parameter captures:

$$\left(\overline{\Delta y_{ipt}} - \overline{\Delta y_{cpt}}\right) - \left(\overline{\Delta y_{idt}} - \overline{\Delta y_{cdt}}\right). \quad (6)$$

It is a triple difference, i.e. a double difference in export growth rates. The difference in export growth between a treated country *i* and a control country *c* for a non-treated product *d*, is subtracted from the same difference in growth rates for a treated product *p*. Hence, if there are beneficial circumstances Z_{it} in country *i* that raise its exports across the board, it will also raise exports for non-treated products and the calculation will control for that. An example would be a country only becoming eligible for preferential market access under AGOA after it exits a civil war, which could coincide with an overall recovery of its economy. Similarly, if there are product-specific circumstances Z_{pt} that raise imports of product *p* from everywhere, the calculation also controls for that as export growth for that product from non-treated countries Δy_{cpt} will be elevated as well. An example here would be the EU granting more generous market access for textile products exactly at a time when the emergence of fast fashion firms is raising demand for apparel products overall.

An alternative way to understand the logic of the triple-difference specification is to see what the included fixed effects in equation (5) implicitly accomplish. The country-product interaction fixed effect has the effect of taking a within-difference of the dependent variable, such that only the growth over time in exports within each country-product category can contribute to the identification. To the extent that this within-growth rate is correlated with the country-products combinations being treated, it will raise the estimate of β. However, not the full correlation contributes, only the correlation that remains after projecting the within

country-product growth on a full set of country-year dummies, that purge them from effects common to all products (treated or untreated) and a full set of product-year dummies that purge effects common to all countries (treated or untreated). In the first category are country-level business cycles, the development process that changes tastes, weather induced fluctuations, demographic or regional transitions, etc. In the second category are demand evolution in the import market, technological change that affects product supply, price changes for complement or substitute products, etc.

In sum, not the full correlation between post-treatment growth in country-product specific exports, i.e. $y_{ip1} - y_{ip0}$, and the treatment indicator I_{ip} contribute to identification. We only exploit the correlation that is orthogonal to country and product fixed effects, which control for average country-level growth $(\overline{y_{i\cdot 1}} - \overline{y_{i\cdot 0}})$ and product-level export growth $\left(\overline{y_{\cdot p1}} - \overline{y_{\cdot p0}}\right)$.

4.2 Discrete or continuous changes in market access

So far we have been silent on what the market access variable X_t or X_{ipt} represents. The triple difference approach is applicable even if treatment, i.e. improved market access, is an all-or-nothing proposition. This is the case in the evaluation of AGOA in Frazer and Van Biesebroeck (2010). What is needed is that in every treated country there are some treated and untreated products.

In the application to AGOA, countries gain eligibility at different points in time and eligibility even starts at different times for different products. Such timing variation strengthens the identifying power in practice. For some products a strong overall export performance in a country at a particular time $(\overline{y_{i\cdot t}})$ will be subtracted from the growth of some treated products (if they are already eligible at time *t*), but the same effect is subtracted from the growth of control, if a product is not yet treated at time *t.*

We need a minimum of eight observations to just identify a triple-difference estimate. We only need to observe two countries (one treated and one untreated), two products in each country (one treated and one untreated), and observe exports twice for each of the four country-product observations (once prior to treatment and once post-treatment). In that case, the point-estimate for β exactly equals $\left[\left(\Delta y_{ip} - \Delta y_{cp}\right) - \left(\Delta y_{id} - \Delta y_{cd}\right)\right]$, with the Δ operator a time difference.[16] If the sample contains more countries, products, or time periods, we will obtain a standard error on the estimate.

With more data, one can also allow the β estimate to vary along some of the dimensions. In particular, the specification (2) directly models the level of exports. It implicitly assumes that adjustment to trade liberalization is instantaneous. The coefficient estimates the once and for all boost in export levels post-liberalization. If we observe several time periods pre- and post-liberalization, the coefficient will measure the difference in the average pre and post export level, after controlling for all the fixed effects. It is natural to assume that it takes some

[16] Of course, we obtain the same estimate if we invert the role of products and countries: $\left[\left(\Delta y_{ip} - \Delta y_{id}\right) - \left(\Delta y_{cp} - \Delta y_{cd}\right)\right]$.

time for the new equilibrium to be reached. This can be straightforwardly incorporated in the estimation by interacting the $\beta X_t I_{ip}$ term with indicators for the time since liberalization:

$$\beta X_t I_{ip} \;\longrightarrow\; \sum_{\tau=1,2,\ldots} \beta_\tau \, \gamma_{t_1+\tau} \, X_{t_1} \, I_{ip} \tag{7}$$

with t_1 the time when the liberalization takes effect, $\gamma_{t_1+\tau}$ a dummy that taken a value of 1 at time $t_1 + \tau$, and the extent of the liberalization now denoted by X_{t_1} which does not change over time.

We can similarly include interactions between the $\beta X_t I_{ip}$ term and product categories if we expect effects to be heterogeneous along the product dimension. In particular, when we apply the triple difference to textile exports, we will include interactions with dummies for the textile, apparel and leather & footwear segments. It is not implausible that products in sectors at different vertical stages of the supply chain are differentially affected by trade liberalization.

To implement the triple difference methodology, we need to include export flows from control observations for which market access does not change. This is not always straightforward. For example, when evaluating the export response from a poor African country under AGOA, the evolution of exports from a rich country like Japan is unlikely to provide a good benchmark. Even within the 6-digit HS classification that we use to define products, there is often systematic variation in the type of exports coming from developed countries and from Africa. The product-year fixed effects will not work as intended if there are sub-segments within the observed product category, e.g. high and low quality goods, and the treated and control countries systematically operate in distinct segments.

A solution would be to only include countries with similar levels of development as the treated countries in the control group, as in Frazer and Van Biesebroeck (2010). This works well for the evaluation of AGOA where only African countries were eligible, but it poses a problem if almost all poor countries are treated, as in the case of the EU's GSP system. It is simply impossible to find a group of control countries that are on the one hand similar to the countries benefiting from market access under GSP, while on the other hand not benefitting themselves.

Thelle et al. (2015) used a variant of the triple difference identification method, as they observed different intensities of treatment. However, it does require a functional form restriction on the nature of the export-enhancing effect. Specification (5) can be estimated solely on a sample of treated countries, if one defines the explanatory variable X_{ipt} as the country-product specific level of market access which varies across observations in the sample. The implicit assumption is that the effect of a difference $\left(X_{ipt} - X_{cpt}\right)$ on the corresponding difference in export levels is constant over the range of *X*. Lowering the tariff by 5 percentage points, if that is the unit in which we measure *X*, has half the impact on export levels as lowering the tariff by 10 percentage points.

It does imply, however, that including X_{ipt} or $\ln X_{ipt}$ in the equation will lead to different estimates of β. In the first case, it assumes a constant effect of changing tariffs by one percentage point. In the second case, a relative change in tariffs is assumed to have a constant

effect, e.g. halving tariff rates boosts exports to the same extent whether they are halved from an initial level of 5% or 10%. In an explicit theoretical model of firm behavior, one could derive which of the two assumptions is more plausible, but from a purely descriptive perspective both are possible. We just need to impose one of the two in order to estimate the coefficient of interest on a sample where all observations are treated. In our implementation below, we will make the first assumption, i.e. assume a constant export response for each percentage point change in tariffs.

If the explanatory variable is discrete, i.e. market access is restricted or liberal, it is only possible to estimate specification (5) on a sample that only contains treated countries if the time at which countries gain liberalized market access varies across country-product pairs. If there is time-variation in the implementation of the liberalization, the product-time fixed effects will not be fully collinear with the gain in market access.

4.3 Change in exporting at the intensive or the extensive margin

In the literature on estimating gravity equations, there is a lot of attention for the fact that for many country-pairs there are no trade flows recorded (Silva and Tenreyro 2006; Helpman, Melitz, Rubenstein, 2008). The problem is that observations with zero trade have to be dropped from the sample when estimating gravity models in the usual log-linear form. This sample selection can have an impact on the elasticity estimates. A second issue is that the elasticity of export performance with respect to market access might differ at the intensive margin—i.e., on the volume of trade—and the extensive margin—i.e., on the likelihood that a trade flow is positive.

A straightforward solution, implemented by Frazer and Van Biesebroeck (2010), is to estimate two separate equations, one with as dependent variable $\ln(y_{ipt} + 1)$ and a second equation with a dummy variable $1[y_{ipt} > 0]$ as dependent variable. Given that the specification is not linked to an explicit structural model, there is no prior on the functional form relationship between the export performance and market access. By adding a small unit to the export volume before taking logarithms, all observations are retained in the equation. One can experiment with different values, e.g. adding $1 or $1,000, to verify robustness. The second equation, on export market participation, is estimated by a linear probability model that still allows for the full range of interaction fixed effects.

An additional advantage of the above transformation is that it implies estimating on a balanced panel using the full set of countries, industries, and years. In that case, estimation is straightforward as all double-interactions drop out of the sample after successive within-transformations of the data. The dependent variable and included explanatory variables can simple be demeaned recursively along each of the three dimensions. On a balanced panel, the dummies for the second dimension are all transformed in the same way when one de-means along the first dimension. They remain dummies and will be eliminated after de-meaning along the second dimension.

A potential problem is that the estimated elasticity is an average of the elasticity at the intensive and extensive margins and the relative weight in this average will vary across countries with different trade exposure. As the same product-year fixed effects are applied to all countries, while the relative importance of zero trade flows across products will generally

vary across countries, the use of a balanced panel imposes implicit restrictions. Luckily, the novel estimator developed by Guimaraes and Portugal (2010) is able to estimate high-dimensional fixed effects in an iterative procedure on an unbalanced panel.

One might also worry about the linearity of the estimating equations. However, the nature of our application is to only look at very local changes. The level of exports and the extent of export market participation is mostly captured by the rich set of double interaction dummies. In particular, the specification includes a country-product interaction dummy that fixes the average export performance. We then only estimate how this average performance is influenced at the margin by small changes in market access. Hence, the linearization that Santos Silva and Tenreyro (2006) concern themselves with is of a secondary importance here. Similarly, the use of a non-linear model for export market participation, e.g. a logit or probit model, is of lesser value here. The change in market access will only influence the probability of participation marginally and the included fixed effects will make sure the predicted probabilities are bounded away from zero and one.

5. Data

5.1 Sources

We perform the analysis on a detailed dataset that combines trade data with information on market access for imports into the European Union and the United States of around 5,000 products under various preferential schemes.

The trade data consists of bilateral import and export transaction values taken from BACI which is the World trade database developed by the CEPII at a 6-digit level of product disaggregation, classified according to the Harmonized System (HS) 1992 nomenclature, for more than 200 countries from 1995 to 2016.[17] An advantage of using BACI rather than the underlying information from UN Comtrade is that the same trade flow, which can be reported differently by the exporter and importer, has been reconciled in order to have a single statistic on each directional bilateral relationship. BACI only reports positive trade flows and we balance the dataset along three dimensions (exporter, product, and time) by including zero-valued trade flows.

We measure changes in market access in two ways: whether the exporter-product pair is under a preferential trade agreement (discrete measure) and the magnitude of the preferences granted (continuous measure). To construct the latter, we use information on ad-valorem tariff rates applicable under each preferential scheme—GSP, EBA and GSP+ for imports into the EU and AGOA for imports into the United States—for all beneficiary countries. These data are obtained from WITS, a database maintained by the World Bank which provides access to several international measures. The original source of tariffs rates in WITS is UNCTAD TRAINS. In order to calculate the preferential tariff margin, defined as the difference between preferential and non-preferential rates, we also include the MFN tariff rate for all products. The WITS database contains an identifier for groups of countries to which a particular tariff

[17] Original data are provided by the United Nations Statistical Division (COMTRADE database). BACI is constructed using a procedure which reconciles the declaration of importers and exporters as explained in Gaulier and Zignago (2010).

applies and the list of countries within that group. In the case where a country gains or loses eligibility for a specific trade regime, the country enters or exits the group. We observe variation over time in the list of countries that benefit under each of the trade regimes.

Product codes for tariffs are defined at a 10-digit level in the WITS database. This is a further breakdown of the 8-digit Combined Nomenclature (CN) used by the EU, of which the first six digits are taken from the Harmonized System (HS) nomenclature. Both the HS and CN nomenclature are regularly updated, eliminating some product codes, and introducing, amending or merging others. To make sure we track the same products over time, we converted and aggregated the product codes in the tariff data to a uniform HS1992 6-digit level of classification (using conversion tables from the WITS database). This is the same nomenclature as used for the import data and the most detailed classification that is shared by all countries. To aggregate tariff rates, we take simple averages across all 10-digit product codes within a 6-digit product category.

The construction of the discrete measure of market access is based on different data sources for the EU and the United States. For the EU, there is no public available information at this level of disaggregation. Therefore, we infer whether the exporter-product pair is granted preferential access from the list of products and countries affected by the various trading regimes as reported in WITS.[18] For the United States, the list of products and countries that are eligible for AGOA treatment is publicly available and published on the US Trade Representative, US International Trade Administration and AGOA websites.[19]

5.2 Sample

After cleaning and merging the trade flows data with information on market access, we are left with a dataset covering 186 countries that report trade flows directed to the United States and/or the EU. For consistency, we define the EU as the 15 countries which were part of the union from the beginning to the end of the sample period (1995-2016), namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. We exclude trade flows from the United States or the EU in the other imports' dataset, as well as imports coming from a few small islands or territories characterized by conflicts.

The list of products considered in the analysis is as follows. We started as exhaustively as possible, including all available products at the 6-digit HS level (total number of products imported is 5,018 for the EU and 5,031 for the United States). We then excluded oil and arts objects, because oil dominates exports of several countries and the supply response for both types of products is likely to be different from other products. Next, we also exclude products which report missing values on their MFN tariffs in any year and products for which the MFN

[18] The specific name in WITS are: European Union GSP, European Union GSP for LDCs (or EBA) and EU Special Incentive Arrangement (or GSP+).

[19] More specifically, for years 1998 to 2005, we used the data from Frazer and Van Biesebroeck (2010), which they retrieved from the US Trade Representative and US International Trade Administration. Data for years 1995-1997 and 2006-2016 have been recovered from multiple sources, but primarily from the AGOA website.

rate equals zero throughout the entire period. This leaves us with a sample of 3,885 products imported into the EU and 3,176 into the United States.

5.3 Variables

We use two dependent variable in the analysis. Export performance at the intensive margin is measured by the logarithm of annual import of a particular product from each country into either the EU or the United States between 1995 and 2016. If nothing is reported, imports are set to zero. To study the extensive margin response, we use a dummy variable that takes the value of 1 if imports are positive.

The main explanatory variables are the change in market access defined in two ways, discrete and continuous. The discrete measure is given by the interaction of three variables: (i) whether a country is eligible or not for any preferential trade agreement, (ii) whether a product is or is not eligible for the same trade regime, and (iii) whether the trade regime for that country-product pair is in effect in a given year. The interaction between these country-product-year dimensions defies the explanatory variable of interest. Moreover, for the United States, a further distinction is made between apparel and non-apparel products since their eligibility status for AGOA follows two different procedures.

To construct the continuous indicator of market access, we use ad-valorem tariff rates. It is computed as the difference between the MFN rate and the lowest tariff among the preferential rates granted to a country-product pair under the various scheme that we consider (if there is more than one). This way, we select only products for which an ad-valorem tariff measure is reported, excluding products with a quota or other forms of trade protection, such as specific tariffs (which are mostly limited to agriculture).

6. Results

6.1 Effects of trade liberalization on export performance

The effects of discrete measures of market access improvement on exports are shown in Table 1. The first three columns show effects at the intensive margin and the three columns on the right are the effects at the extensive margin. The top panel (a) reports results for EU imports. On average, being included on the GSP list raises exports at the product-exporter level by 6%, while receiving benefits under the GSP+ scheme raises exports by 9.5%. This is intuitive, as the GSP+ scheme is more exclusive, gives a larger tariff preference, and extends to several products that are deemed more sensitive by the EU, which sometimes means that developing countries have a more natural comparative advantage for such products. Finally, the EBA scheme is the most generous, abolishing all tariffs and quotas for eligible countries, and has the largest effect. On average, it boosts exports by 12.9%, more than twice as much as under the baseline GSP.

Table 1: Effects of discrete indicators of trade liberalization on exports

	Dependent variable is log(imports)			Dependent variable is a discrete import-dummy		
	All products	Textile, apparel, and leather products		All products	Textile, apparel, and leather products	
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
(a) Effects of GSP on EU imports						
GSP	0.0602***	0.0450*	0.0674**	0.0019*	0.0094*	0.0042
	(0.004)	(0.020)	(0.025)	(0.001)	(0.004)	(0.005)
GSP+	0.0951***	0.0186	0.1407**	0.0078***	0.0017	0.0271*
	(0.007)	(0.042)	(0.050)	(0.001)	(0.009)	(0.011)
EBA	0.1286***	0.0643*	0.2150***	0.0110***	0.0136*	0.0341***
	(0.005)	(0.032)	(0.046)	(0.001)	(0.006)	(0.009)
- Textile * GSP			-0.0418*			0.0080*
			(0.017)			(0.003)
Textile * GSP+			-0.2817***			-0.0598
			(0.033)			(0.007)
Textile * EBA			-0.2310***			-0.0325***
			(0.036)			(0.007)
- Apparel * GSP			0.0758***			0.0117**
			(0.018)			(0.004)
Apparel * GSP+			0.1371***			0.0226**
			(0.035)			(0.008)
Apparel * EBA			-0.0706			-0.0096
			(0.040)			(0.008)
Observations	15,345,396	3,105,872	3,105,872	15,345,396	3,105,872	3,105,872
(b) Effects of AGOA on US imports						
	(1c)	(2c)	(3c)	(1d)	(2d)	(3d)
GSP products	0.0313***			0.0062***		
	(0.006)			(0.001)		
Apparel provision	0.2198***	0.1526***	-0.0010	0.0211***	.0150***	-0.0003
	(0.013)	(0.012)	(0.032)	(0.002)	(0.002)	(0.008)
- AP * Apparel			0.1605***			0.0160*
			(0.035)			(0.009)
	12,926,320	3,117,620	3,117,620	12,926,320	3,117,620	3,117,620

Notes: Results are based on fixed effects regressions that include all double interaction dummies: exporter-product, product-year, and exporter-year. The results in columns (1) include all products in the sample, except for oil, art objects, products with missing MFN tariffs in some years, and products with MFN tariffs equal to zero over the entire sample period. Results in columns (2) and (3) limit the sample to textiles, apparel, and footwear & headwear (HS 50-64). Results in column (3) use footwear & headwear as the excluded category. Standard errors are clustered at the country-product level. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***.

Effects at the extensive margin on the right show a similar pattern. They are all estimated positive and statistically significant. Here the effects of GSP, GSP+, and EBA are respectively 0.2%, 0.8%, and 1.1%. These values indicate the percentage point increase in the probability a particular product is exported from an eligible exporter to the EU once the respective GSP scheme takes effect. While these numbers are small, to put them in perspective one should compare them to the unconditional probabilities. On the sub-sample of countries and products that are ever GSP eligible, the average export market penetration is just below 15% and for GSP+ country-products it is 16.6%. It still suggests that the effects are rather small, but

market penetration is a lot lower for sub-Saharan countries. On the sample of EBA eligible country-product pairs, the unconditional market penetration is below 5% and compared to this baseline, the EBA point estimate of 1.1% is quite large.

Corresponding results for US imports under the AGOA scheme are reported in the bottom panel (b) of Table 1. For standard products that were added to the US GSP list, the effect is estimated at 3.1%, while for apparel products the point estimate is a lot higher, at 0.2189. While small effects on log-exports can be interpreted directly as percentages, this is not the case for larger effects. In this case, the percentage response is 24.6%, which is calculated as exp(0.2198)-1. Extensive margin results are quite sizeable: 0.6% for general GSP products and 2.1% for products falling under the apparel provision.

The effects of the different preference schemes are quite substantial, but are also likely to vary by type of product. Products under the apparel provision of AGOA experienced an export increase that was seven times larger than for regular (GSP) products. The results in the second column shows effects estimated separately for the broad textile industry, which comprises textile, apparel, and footwear, leather & headgear. For AGOA, both the effects at the intensive and extensive margin are estimated to be slightly lower. This is because the country-year fixed effects that control for any shocks to the national economies are now estimated solely on various textile products and they control more flexibly for changes in the country-level environment that is particularly conducive for textile products. Even at 0.153 (16.5%) and 0.015 (1.5%) the effects are quite substantial.

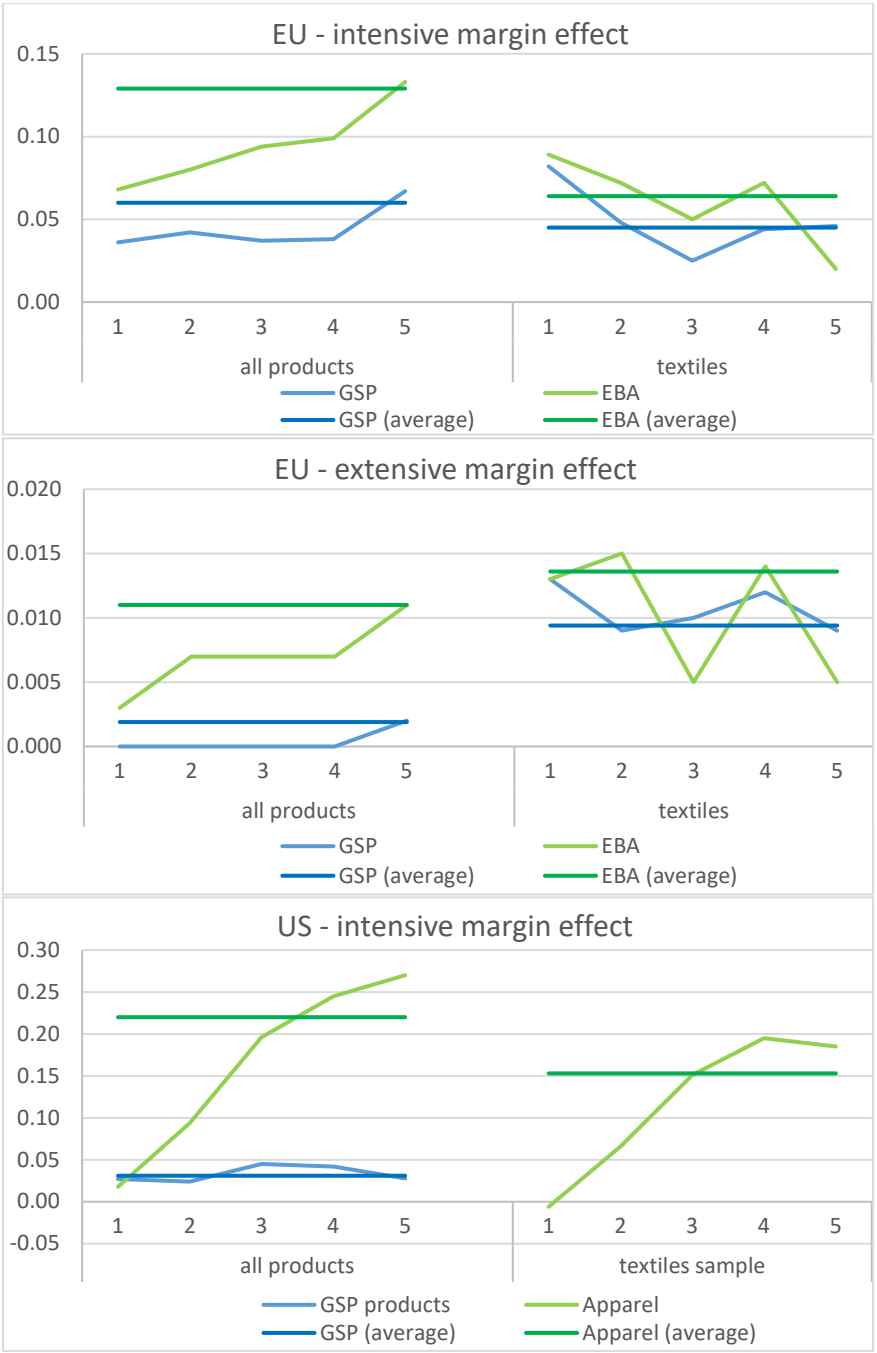
For EU imports, coefficients on all three schemes are lower and estimated much less precisely once we limit the sample to textile products. For the standard GSP scheme, export growth for textiles stands at approximately three quarters of the export boost estimated for the average product. For the EBA scheme, the effects is half as large, and for the GSP+ scheme the effect is no longer statistically significant. On the extensive margin, effects are larger for the EBA scheme and much larger for the GSP scheme. The probability that a country-product observation which becomes GSP or EBA eligible records a positive export flow is, respectively 1.0% and 1.4% higher than for ineligible country-product pairs, even though the unconditional probability are of a similar magnitude.

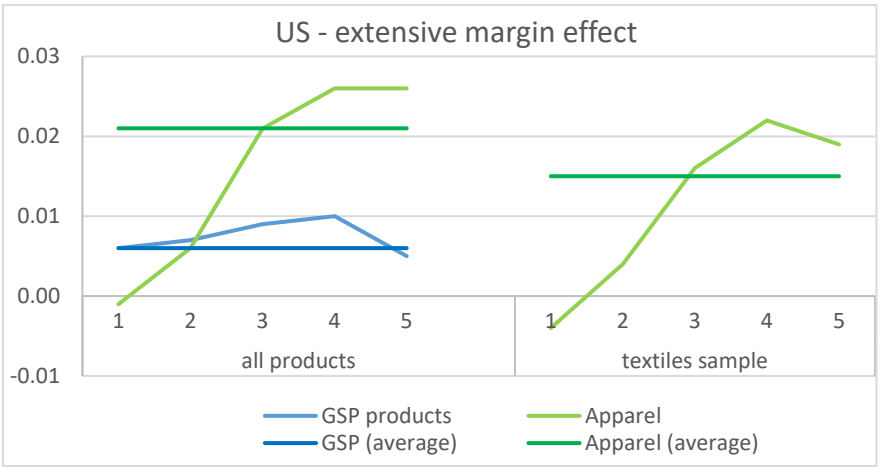
Finally, in columns (3) we show results interacting each scheme with separate indicators for the textile and apparel sub-groups. The reference category is footwear & headgear. For the other two categories, the overall effect is obtained by summing the baseline and interaction coefficients. These results show that the export response is smaller, even much smaller, for textiles. None of the three EU schemes still show a significantly positive effect for textiles at the intensive margin. In contrast, the export responses for footwear & headgear are particularly strong; under the EBA they even exceed the estimates under AGOA. The response of apparel exports to the EU is larger still, but the largest effect is recorded by the GSP+ scheme. Its intensive margin export response for apparel totals 0.278 (0.1407+0.1371) or an export increase of 32%.

The estimates in Table 1 capture the average export levels in the post-liberalization period. Of course, African exports do not adjust instantaneously. We can investigate the time it takes to transition to the new steady state by interacting the explanatory variables with a dummy variable that measures the number of years since the start of the liberalization, as in equation

(7). We report the full set of time-varying estimates with standard errors that correspond to the average results in Table 1 in Tables B.1 and B.2 in the Appendix.

Figure 5: Time-varying effects of trade liberalization





Notes: Full point estimates for the results in all three graphs are reported in Tables B.1 and B.2 in the Appendix.

In Figure 5 we show the point estimates in four separate panels for the effect on exports to the EU and United States at the intensive and at the extensive margin. The graphs on the left are always for the effects estimated on the full sample, corresponding to column (1) in Table 1, and on the right the effects estimated on the sample of textile products (broadly defined), i.e. corresponding to results in column (2) of Table 1. The blue and green lines are for different strengths of liberalization and the dark lines show the average effects that were already reported in Table 1.

Especially for the extensive margin effects, it often takes several years for the full effects to be realized. In most cases the effect for year 5, which is estimated to remain constant afterwards, is estimated higher than the average effect, which also includes the initial years. In a few cases, in particular for the apparel effects of the AGOA act, the final effect is notably higher than the average effect. In almost all cases, the effects do not seem to be growing anymore 5 years after the initial liberalization.

The interpretation of the estimates is for (eventually) a permanent increase of exports to the new, elevated level once a country-product becomes eligible for one of the schemes. Naturally, this pools over a lot of different liberalization experiences where the absolute benefit of a scheme relative to MFN treatment varies a lot. To some extent this was captured by various treatment levels that the different schemes represent, but even within each scheme there is a lot of variation. Given that the point estimates increase with the scheme's generosity suggests, it makes sense to use a quantitative measure of market access improvement as explanatory variable.

For these results reported in Table 2, the extent of market access improvement is measured by the difference between the applied tariff and the benchmark MFN rate. Results can now be reported in the same way for EU imports in the top panel (a) and for US imports in the bottom panel (b). Interpreting the coefficients is now also more straightforward. They all measure the percent response in the level of exports or export probability for each percentage point tariff advantage conferred by a scheme. The benchmark effect on EU imports on the full sample, in column (1a), indicates that lowering tariffs by one percentage point raises exports by 0.72%, while the corresponding effect on US imports is 0.30%.

Table 2: Effects of trade liberalization on exports identified from the size of trade preferences

	Dependent variable is log(imports)			Dependent variable is a discrete import-dummy		
	All products	Textile, apparel, and leather products		All products	Textile, apparel, and leather products	
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
(a) Effects of GSP on EU imports						
DIFF	0.7261***	1.9923***	1.7690***	0.0602***	0.4023***	0.3376***
	(0.046)	(0.164)	(0.320)	(0.009)	(0.036)	(0.065)
- DIFF * Apparel			0.1013			0.0351
			(0.318)			(0.065)
- DIFF * Textile			-2.6749***			-0.6707***
			(0.321)			(0.066)
Observations	15,345,396	3,105,872	3,105,872	15,345,396	3,105,872	3,105,872
(b) Effects of trade preference through AGOA on US imports						
	(1c)	(2c)	(3c)	(1d)	(2d)	(3d)
DIFF	0.3025***	0.7460***	0.1864*	0.0314***	0.0907***	0.0238
	(0.028)	(0.066)	(0.093)	(0.005)	(0.012)	(0.021)
- DIFF * Apparel			0.8176***			0.1012***
			(0.131)			(0.026)
- DIFF * Textile			0.2651			-0.0054
			(0.287)			(0.059)
Observations	12,926,320	3,117,620	3,117,620	12,926,320	3,117,620	3,117,620

Notes: Results are based on fixed effects regressions that include all double interaction dummies: exporter-product, product-year, and exporter-year. The results in columns (1) include all products in the sample, except for oil, art objects, products with missing MFN tariffs in some years, and products with MFN tariffs equal to zero over the entire sample period. Results in columns (2) and (3) limit the sample to textiles, apparel, and footwear & headwear (HS 50-64). Results in column (3) use footwear & headwear as the excluded category. Standard errors are clustered at the country-product level. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***.

To put these numbers in perspective, it is useful to know that the average value of DIFF, the absolute tariff preference, for EU imports is 0.041, if it is positive. The average response is thus around 3% (= 0.041*0.7261). For a product at the 90th percentile, the tariff reduction is 0.08 and the export response will be twice as large. The point estimate is a lot lower for US imports, but the average tariff reduction is slightly higher, at 0.047. The average effect is approximately half the size as in the EU.

Effects are two to three times larger on the sample of all textile products. In contrast with the results in Table 1 for the EU, exports of textiles are now estimated to be more responsive to trade liberalization. The average effects is also larger, given that the tariff advantage is slightly larger at 0.045. The results for the EU and the United States are now similar. The results in column (3) confirm that the export response within the broader textile category is largest for apparel products. For EU imports the elasticity with respect to each percentage point tariff cut is 1.87 and for US imports it is 1.00.

Results are similar at the extensive margin, reported in the three right-most columns of Table 2. Effects are larger for the EU than for the US; they are larger for textiles than for other products; and within textiles they are largest for apparel. All point estimates are estimated very precisely and they are plausible in terms of economic magnitudes.

6.2 Interaction between trade liberalization and Chinese imports

The results reported in Table 1 and Table 2 control flexibly for the baseline level of country-product exports, as well as for product-specific time effects that are shared by all exporters and country-specific time effects that affect all of a country's exports in the same way. It is not easy to find control variables that vary along all three dimensions, but one such candidate is the level of Chinese imports into each exporter's own economy. The rising importance of China in the global economy is definitely one of the most prominent evolutions of the last two decades and it affects all economies in a myriad of ways. An overview of such effects and their identification, focusing mostly on the labor market, is provided in Autor, Dorn and Hanson (2016).

Firms that have to contend with increased exports on their home markets can respond in various way. Lower sales at home could go hand in hand with higher sales abroad. For example, Almunia et al. (2018) document such a response during the Great Recession. Firms in Spain responded to cyclically lower domestic demand by increasing export sales. Especially when firms face an upward-sloping marginal costs schedule or when they face capacity constraints, this is a likely response as domestic sales have a direct negative externality on export sales.

However, when the reduction in domestic sales is of a more permanent nature, as would be the case when it is driven by higher Chinese imports, it is also possible that such a disruption at home lowers export sales. Firms would be deprived of revenue to develop new products, improve existing ones, or even pay for the fixed costs necessary to access foreign markets. Such a mechanism plays the reverse role in the model of Fan, Li and Yeaple (2015). In their case, tariff cuts on imported intermediates raise domestic profits and some firms use this revenue to finance the fixed costs of upgrading their product quality and achieve greater export success. In our case, lower domestic profits because of competition with final product imports could make it harder for firms to finance fixed costs of upgrading or exporting.

The results reported in Table 3 indicate that in our sample, higher imports from China of a particular product tend to be associated with higher exports to the EU or to the United States from that same country for the same product. Effects on EU imports are shown on the left and on US imports on the right. Both effects are similar in absolute magnitude, respectively 2.2% and 1.7% in the specifications with discrete measures for trade liberalization on the sample of all products. They are consistent with firms looking for alternative markets for their products when they face lower demand or greater competition domestically.

The estimates estimated only on textile products, in columns labeled (2), are relatively similar. All four point estimates on the intensity of Chinese imports are positive, but they are slightly smaller than in columns (1). For US imports in particular the point estimates are approximately cut in half, but they remain positive and statistically significant.

Table 3: Effects of trade liberalization on exports in the presence of Chinese imports

	Effects of GSP on EU imports			Effects of AGOA on US imports		
	All products	Textile, apparel, and leather products		All products	Textile, apparel, and leather products	
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
(a) Effect of discrete indicators of trade liberalization						
GSP	0.0603**	0.0453*	0.0417*	0.0299***		
	(0.004)	(0.020)	(0.020)	(0.006)		
GSP+	0.0945***	0.0127	0.0026			
	(0.007)	(0.041)	(0.041)			
EBA	0.1272***	0.0642*	0.0196			
	(0.005)	(0.032)	(0.032)			
Apparel provision				0.2170***	0.1509***	0.1479***
				(0.013)	(0.012)	(0.012)
log(Chinese imports)	0.0224***	0.0183***	0.0168***	0.0169***	0.0077***	0.0074***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
GSP * log(Ch. imp)			-0.0162***			
			(0.002)			
GSP+ *log(Ch. imp)			-0.0066*			
			(0.003)			
EBA * log(Ch. imp)			-0.0371***			
			(0.002)			
AP * log(Ch. imp)						0.0355***
						(0.005)
Observations	15,345,396	3,105,872	3,105,872	12,856,448	3,100,768	3,100,768
(b) Effects identified from the size of trade preferences						
	(1c)	(2c)	(3c)	(1d)	(2d)	(3d)
DIFF	0.7308***	1.9234***	1.9860***	0.3015***	0.7462***	0.7272***
	(0.046)	(0.164)	(0.162)	(0.028)	(0.066)	(0.062)
log(Chinese imports)	0.0225***	0.0181***	0.0181***	0.0170***	0.0078***	0.0077***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
DIFF * log(Ch. Imp)			-0.0533**			0.0591*
			(0.018)			(0.026)
Observations	15,345,396	3,105,872	3,105,872	12,856,448	3,100,768	3,100,768

Notes: Results are based on fixed effects regressions that include all double interaction dummies: exporter-product, product-year, and exporter-year. The sample includes all products, except for oil, art objects, products with missing MFN tariffs in some years, and products with MFN tariffs equal to zero over the entire sample period. Results in columns labeled (a) are for exports to the EU and in (c) columns for exports to the United States. Results in the top panel use discrete liberalization indicators to identify the effects (using the same identification as in Table 1) and results in the bottom panel (b) use the magnitude of trade preferences to identify the effects (as in Table 2). Standard errors are clustered at the country-product level. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***.

Finally, in column (3) we include interactions of the measures for trade liberalization and Chinese import. The results are entirely robust for the two identification methods, i.e. using discrete GSP or AGOA indicators in panel (a) or using the magnitude of the tariff reduction in panel (b). But the effects now consistently show the opposite sign on EU and US imports. In the US case, the positive coefficient on the interaction coefficient implies that countries receiving large Chinese imports not only export more to the US overall, they take disproportionately advantage of the AGOA market access improvement, raising their exports of eligible textile products more than for ineligible products. The absolute difference is not

huge, recall that we need to multiply with the average value of DIFF (around 0.045) to get the average effect, but it appears in both panels of column (3c).

In the case of the EU, the pattern goes the other way for each of the three GSP schemes. The effect of trade liberalization is reduced for products where Chinese imports in these countries rise the most. Put differently, the increase in exports of products with large domestic imports from China is weaker in product categories that benefit from trade liberalization. This would be consistent with the disruptive effect of increased domestic imports, which make it harder for firms to make the necessary adjustments or investments needed to take advantage of the EU trade liberalization.

As discussed before, Rotunno, Vézina, and Wang (2013) provide evidence that some of the exports from sub-Saharan Africa to the United States in response to AGOA represent transshipments of Chinese exports through these countries. As the United States imposed some safeguard trade barriers on Chinese apparel imports after the MFA ended, some Chinese firms started to export to the United States indirectly through sub-Saharan countries that still benefitted from duty-free and quota-free access to the US market. These results are consistent with such an effect. It does not show up for exports to the EU. While the EU also erected some temporary trade barriers when the MFA ended, this was not as prevalent as in the United States. Moreover, existing export volumes from Africa to Europe were already a lot larger and it might simply be more difficult to detect this effect.

7. Policy implications

To put the policy implications of our findings in perspective, we discuss two issues. First, we consider a number of caveats and ways in which the positive effects on trade could be maintained or even strengthened. Second, we show some context for the scope of future export growth through additional tariff liberalization.

7.1 Caveats and durability

(a) Transshipments and local effects

Some of the success of AGOA in boosting African exports towards the United States was due to Chinese firms using AGOA countries as a quota-hopping export platforms to avoid quotas imposed on Chinese apparel. The relevance of this phenomenon is confirmed by the fact that much of the increase in exports from some African countries to the United States did not survive the end of the Multifiber Agreement (MFA) in 2005 when Chinese apparel exports – now quota-free – flooded the US market to the detriment of African exports (Rotunno et al., 2013).

While the transshipment of Chinese exports through AGOA countries has been pervasive for goods directed to the United States, it has been much less of a concern for exports towards the EU. One potential explanation is that while the rules of origin were properly applied under the EU GSP schemes, they were much less stringent in the AGOA legislation. This allowed Chinese exporters to take advantage of this loophole in the US trade agreement, while a more duly application of the rules would have prevented some of the initial AGOA-related export boom.

The presence of footholds of Chinese firms with the goal of exporting under preferential conditions created controversial effects in the African economy. On the one hand, in countries such as Madagascar, these Asian-owned firms accounted for a substantial share of employment, contributing to the creation of new jobs (Gibbon, 2003). On the other hand, the majority of inputs used in these factories were imported from China and already at a final stage of the production process, such that African value added in the production process is often low. Moreover, many of these Asian-owned companies departed once the quota-hopping through AGOA countries become unnecessary with the end of the MFA in 2005, leading to a destruction of those previously-created jobs (Phelps et al., 2008). Eventually, since Asian-owned subsidiaries were set up with the short-term aim of bypassing MFA quotas and benefitting from duty-free access, they did not engage in actively upgrading and creating local technological capabilities which is an important motivation of attracting FDI (Peerally and Cantwell, 2012).

(b) Necessary policy support to make effects permanent

We have shown that unilateral trade agreements can significantly boost exports from developing countries, but can these positive effects become permanent? Collier and Venables (2007) argue that trade preferences can have long-lasting effect on the local economy if they are designed taking into account and leveraging features of modern trade, such as fragmentation and increasing returns to scale. For instance, it is important for African firms to be able to import complementary inputs not subject to tariff restrictions in order to fragment the production process, outsource what they are less capable of doing and exploit their own comparative advantage in more specific segment (Hausmann and Rodrik, 2003). It suggest that to take full advantage of market access that is granted overseas, countries should also liberalize key input sectors in their own economies. Another way of ensuring sustainable growth is to use industrial policy to promote and support the emergence of clusters of activity. This allows firms in a given location to benefit from the presence of other firms because, for instance, there are technological externalities as modeled in Duranton and Puga (2005).

A final condition that allows trade liberalization to be sustained is credibility (Rodrik, 1992), which means that government needs to convince firms and consumers that the trade reforms will be lasting. Thelle et al. (2015) have shown that a percentage point tariff reduction under the EBA scheme has a larger effect on African exports than a comparable percentage point tariff reduction under the GSP. The larger effects of the EBA-related tariff reductions than general GSP preferences, as reported in Table 1, are not only due to larger tariff cuts, but also due to cuts all the way to zero and cuts that are widely believed to be permanent.

(c) Constraining effects of NTBs on export growth at the intensive margin

A final policy aspect to consider is the presence of Non-tariff barriers (NTBs). We have not explicitly considered them in this study even though they are likely to constrain the beneficial effect of trade agreements on exports' growth and aggregate outcomes. In particular for exports of agricultural and food products, where many African countries have a comparative advantage, food safety standards in the EU and the United States are much higher than in Africa.

A problem for the empirical work is that this information is not available at the same level of detail as tariff rates. Moreover, there is an ongoing debate on how to measure NTBs.

Berden et al. (2009), Fontagné et al. (2013) and Egger et al. (2015) propose three different methodologies, but these have not been implemented at a broad scale. Whether our results are biased upward or downward due to the presence of NTBs depends on whether tariff cuts are positively or negatively correlated with changes in tariffs. Both directions are possible. The unilateral nature of the liberalization suggests that Western governments could have reduced all type of trade barriers. However, Brandt et al. (2018) have shown that the Chinese government imposed new NTBs in several sectors after it lowered import tariffs.

The relevance of NTBs has been demonstrated by several studies that show they play an important role in shaping the effectiveness of trade agreements (UNCTAD, 2018). Moreover, their existence does not only directly affect trade flows, but also other outcomes. For instance, Caliendo and Parro (2015) argue that the welfare effects they obtain in their study would have been a lot higher, if they had been able to take reductions of non-tariff barriers into account.

7.2 Potential for future export growth

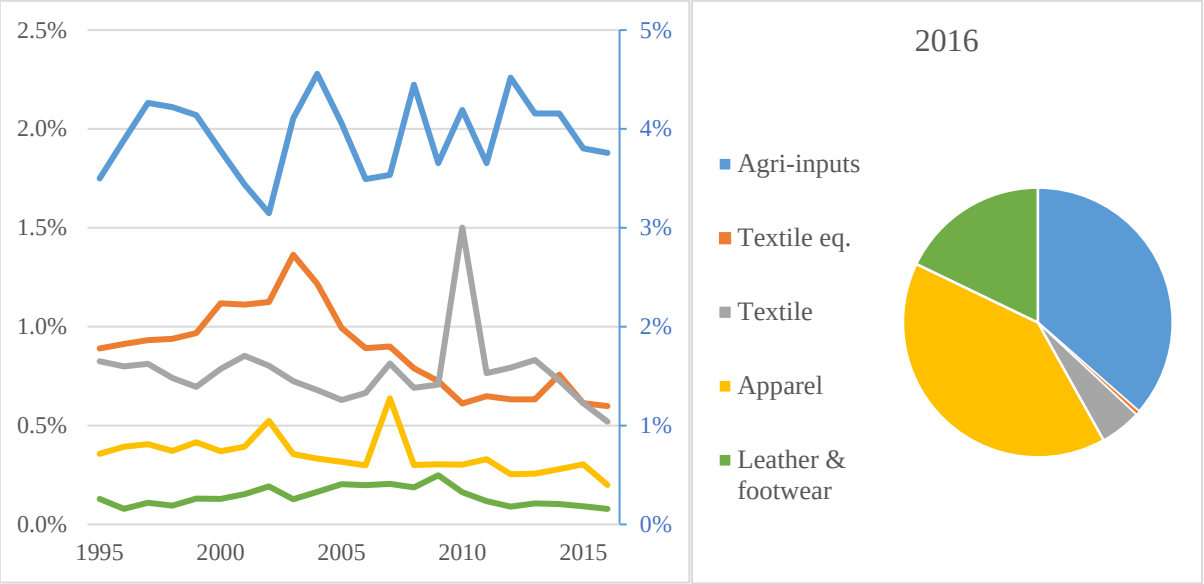
According to Martin and Ng (2004), the weighted average tariff faced by developing countries declined from 30% in 1983 to 11% in 2003, and the majority of this reduction was due to unilateral agreements. The two trade liberalization initiatives that we exploited – the EU's GSP system (including the special versions, GSP+ and EBA) and the US' AGOA – have lowered the tariffs that African countries face in these markets to even lower levels. However, there is still scope for further tariff reductions, also on the tariffs that developing countries charge themselves. Caliendo et al. (2015) find striking results from their counterfactual experiment where they move to a world with zero tariffs for all countries, and in particular they show that most of the extra gains of free trade are for emerging economies.

The comparison of textile exports from sub-Saharan Africa to those from South Asia and China Figure 4 highlighted the current low exports from Africa, which in turn suggests a large potential for future export growth given the evolution of global demand for textile and apparel products. The extremely low share of textile exports from sub-Saharan Africa imply that its growth potential is definitely not constrained from the demand side. The annual increase in global trade in textiles is several times higher than the total annual exports of the region.

In Figure 6 we show separately the evolution of exports for the five product categories in the entire textile supply chain. The sub-Saharan African region has the highest global market share in agricultural inputs (e.g. wool, cotton, silk, etc.), which is shown on the axis on the right. Its share of global trade fluctuated between 3% and 4.5% in this segment. The trend growth rate is positive, but almost imperceptibly small.

Its global market share is always below 1.5% for the other four categories, which are shown on the left axis. The share in 2016 does not exceed the share in 1995 for any of these product categories and in several cases it went down substantially. Clearly, lack of import demand will not constrain African export growth for any of these product segments.

Figure 6: Evolution of different categories of textile exports for sub-Saharan Africa



Note: The left graph shows the share in global trade for five product categories in the textile GVC, calculated using normal values (USD). The agri-inputs (wool, cotton, silk, etc.) are measured on the right scale, the other categories on the left scale. The total value in 2016 was 4.7 billion USD and the pie-chart on the right shows the breakdown by product category.

On the right, we show for the final year how total exports break down across the different categories. Not surprisingly, textile equipment is extremely small, but even textiles account for barely 5% of total exports. The largest category is apparel, which is the most labor intensive segment of the industry, but also the segment showing the highest trade elasticity in our estimates. Agricultural inputs is the second most important segment, which is a natural fit with the important agricultural sector in Africa.

The second factor that determines the potential for future textile exports from sub-Saharan Africa is the remaining tariff protection on these products. Of course, the previous liberalization episodes that we exploited to identify our export supply elasticities, limit the potential benefits that can be gained from further liberalization of market access. We show the remaining import tariff protections for the EU and the United States for the three textile categories and an average over all products in Figure 7. These statistics refer to the last year of our sample period (2016). We show them separately for the different schemes that countries can belong to, and enumerate below the table the members of the different groups, separately for the two regions.

A number of patterns stand out. If countries do not benefit from any preference scheme, average tariffs for textile products are quite a bit higher than for other groups. The darkest bars show average ad-valorem rates of 4.6% for the EU and 4.3% for the United States overall, but for apparel average tariffs are much more punitive, at 11.3% and 10.5%, respectively. Only a few countries are subject to these rates.

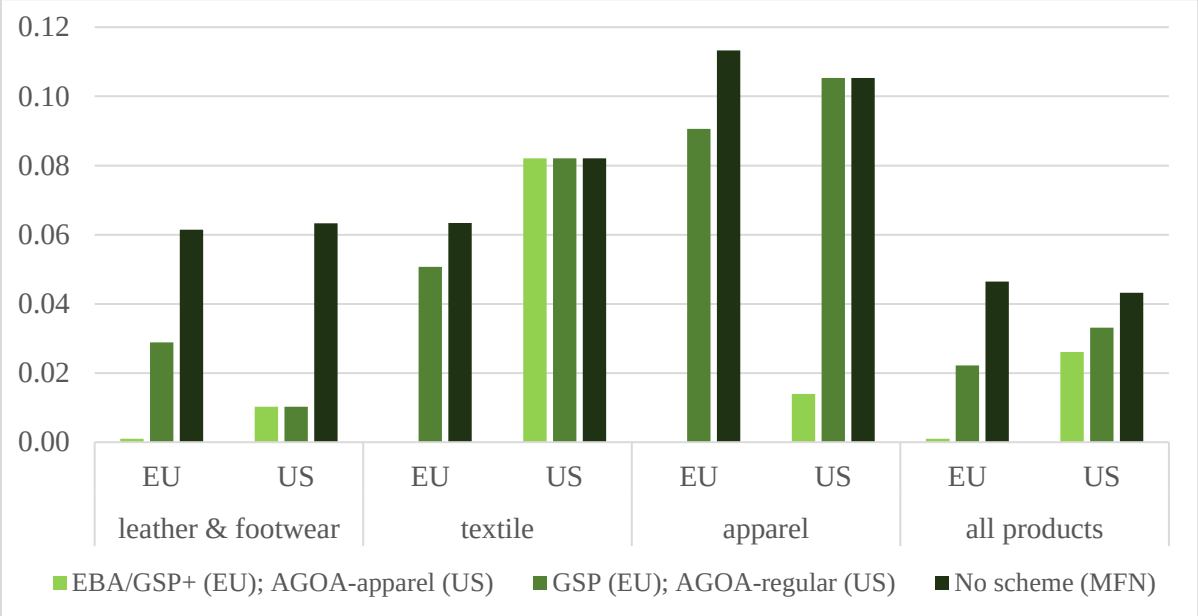
Standard GSP or general AGOA import tariffs, in lighter green, are much lower for leather and footwear, but the benefits they confer for textile or apparel are very limited. The US does not even provide any benefits for textiles and the EU GSP preferences for textiles are much

smaller than for other products. Instead of reducing tariffs by half, they lower tariffs by less than one fifth for textile or apparel products.

The main beneficiaries of the existing schemes are countries qualifying for the EU's EBA scheme, which eliminates tariffs entirely. We lumped the GSP+ with EBA as the preferences are equally large. The AGOA apparel provision is almost equally generous, only leaving an average import tariff of 1.4% for apparel products, but it does not affect other textile categories.

Clearly, the biggest scope for export increases would come from enlarging the set of countries benefiting from the EU's EBA scheme and the apparel provision under AGOA. Extending the generosity of the apparel provision also to other textile segments would help as well, but the overall export-boosting effect will be more limited, given the dominance of the apparel segment.

Figure 7: Ad-valorem tariffs by preference scheme for sub-Saharan African countries (2016)



Source: WITS, unweighted averages across HS 6-digit products (percentages).

EU-GSP: Cameroon, Congo, Cote d'Ivoire, Ghana, Kenya, Nigeria, Swaziland
EU-GSP+: Cape Verde
EU-EBA: Angola, Benin, Burkina Faso, Burundi, Central African Republic, Chad, DRC, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Sudan, Tanzania, Togo, Uganda, Zambia
EU-No scheme (MFN): Botswana, Gabon, Mauritius, Namibia, South Africa, Zimbabwe
US-AGOA (regular): Angola, Burundi, Congo, Djibouti, Gabon, Guinea-Bissau, Mali, Mauritania, Togo
US-AGOA (apparel): Burkina Faso, Benin, Botswana, Chad, Cote d'Ivoire, Cameroon, Cape Verde, Ethiopia, Ghana, Guinea, Kenya, Liberia, Lesotho, Madagascar, Mauritius, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sierra Leone, Senegal, Tanzania, Uganda, South Africa, Zambia
US-No scheme (MFN): DRC, Central African Republic, Eritrea, Gambia, Sudan, Swaziland, Zimbabwe

To have a sense what the absolute magnitude of the effect could be, it is easiest to use the coefficients on the continuous DIFF variable reported in Table 2. The semi-elasticity for EU imports was approximately 1 and for the United States approximately 2. Hence, making a country Zimbabwe eligible for the EBA scheme (currently it qualifies for nothing) is expected to raise its apparel exports to the EU by 22% and exports of other textile products or leather & footwear by 12%. Similarly, making it eligible for AGOA and its apparel provision would raise apparel exports to the US by 9%, leather & footwear exports by 5%, but not change textile exports.

These are long-run effects once adjustments are complete, but they are also permanent, raising the export level in all subsequent years. In addition, countries would also start exporting new products to the EU and United States, but it would take a longer time for these products to have a noticeable effect on aggregate export volumes.

Appendix A:

History and scope of the EU's General System of Preferences[20]

The general system of preferences (GSP) is a unilateral preference program legally embodied under the GATT/WTO framework under the so-called 'enabling clause' adopted in 1979, which allows developed countries to deviate from the MFN principle and give differential and more favourable treatment to imports from developing countries only. While the enabling clause is thus the WTO legal basis for the GSP, it is unilaterally up to the individual preference giving countries to decide which developing countries and products to include in their specific GSP schemes, subject to certain criteria.

The first EU GSP program was introduced in 1971 and have since then frequently been reviewed in terms of both country and product eligibility. Overall, three main waves of GSP can be identified, with first wave covering the period 1971-1994, the second 1995-2005 and the third 2006-2013.[21]

In the initial period, 1971-1994, defining features of the GSP includes annual reviews of beneficiaries and product coverage, in addition to the use of quotas and ceilings on the specific products eligible for preferential access under the scheme. In the period 1995-2005, significant changes were introduced, including the replacement of previous quantitative limits on sensitive products by a modulated tariff system, under which the most sensitive products were given the less favourable tariff reductions.

The second element introduced with the 1995-GSP revision was a policy of graduation. The idea was to limit the preferences to the countries and sectors that needed them. The moment a sector in a country exported intensively to the EU, the sector would be considered sufficiently advanced to no longer receive the benefits of the GSP and the sector would graduate. The most advanced beneficiary countries meeting particular criteria could be removed completely from the list of beneficiary countries. Hong Kong (China), the Republic of Korea and Singapore were the first countries excluded in 1998.

The final innovation was the introduction of a number of special incentive arrangements. They were to be applied on the basis of an additional margin of preference granted to beneficiary countries complying with certain requirements related to labour standards and environmental norms, as well as to countries undertaking effective programmes to combat drug production and trafficking.

Finally, the special arrangement for the least developed countries (LDCs) known as the Everything But Arms (EBA) initiative was introduced and entered into force on 5 March 2001 and allowed free access for the poorest countries in the world for all products except arms and ammunition.

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[20] This description draws heavily on Section 1.2 of Thelle et al. (2015).

[21] From the first of January 2014 a new GSP regime has come into place, but it lies mostly outside our period of analysis. Readers are referred to European Commission (2012) "The EU's New Generalised Scheme of Preferences". For more details for a review of the most important changes introduced.

The least developed countries enjoyed significant preferences under the GSP before the introduction of the EBA. Since 1977 a series of supplementary measures almost totally liberalised GSP access for Least Developed Countries.[22] LDCs were given greater preferences on industrial products, including textiles, benefiting not merely from duty-free entry but complete exemption from the application of preferential Limits. They also benefited from duty-free entry on all agricultural products covered by the GSP plus a supplementary list of some 370 products. This extended list included nearly all agricultural/fishery products in the customs tariff Chapters 1-24 which were not protected by a levy or similar device thus putting LDCs very nearly on a par with the ACP countries.

Furthermore, at the Singapore WTO Ministerial Conference in 1996, WTO members pledged to carry out an action plan to improve access to their markets for products originating in the LDCs. In 1997, the EU Council called for the Singapore conclusions to be implemented by granting LDCs not party to the Lomé Convention preferences equivalent to those enjoyed by signatories and, in the medium term, duty-free access for essentially all their exports.

The significance of the EBA Regulation was to extend deep trade preferences to LDCs on products excluded from the EU's other preferential schemes, such as Cotonou and the GSP. A total of 919 tariff lines (out of the 10,500 tariff lines in total) were affected, almost entirely agricultural products covered by the EU's Common Agricultural Policy (CAP). Only imports of fresh bananas, rice and sugar were not fully liberalised immediately. Duties on those products were gradually reduced and duty free access was granted for bananas in January 2006, for sugar in July 2009 and for rice in September 2009.

In 2005 the EU launched a new GSP scheme which was designed both to be more generous, simpler, more transparent and more stable than its predecessors. The new scheme reduced the number of GSP arrangements from five to the following three:

1. The general arrangement for standard GSP beneficiary countries
2. A special incentive arrangement for sustainable development and good governance (hereafter GSP+) designed for vulnerable countries.
3. The Everything but Arms (EBA)

The new scheme still removed countries when they became competitive in the export of a particular product or range of products. The justification is that the country no longer needed the GSP to promote this product's exports to the EU. However, the mechanism was overhauled and simplified. The previous criteria (share of GSP imports, development index and export-specialisation index) were replaced with a single simpler criterion: the share of the community market expressed as a share of exports from GSP countries. This share is normally 15% but is lowered to 12.5% for textiles and clothing.

Countries may be temporarily excluded from the GSP scheme for a number of reasons including: (i) serious and systematic violation of the principles in the conventions on sustainable development and good governance; (ii) export of goods made by prison labour; (iii) shortcomings in customs controls on export or transit of drugs or failure to comply with international conventions on money laundering; (iv) fraud, irregularities or systematic failure

[22] Most of these were ACP countries and they already benefitted from access via the Lomé accords.

to comply or to ensure compliance with the rules of origin of products and the proof thereof, and to provide administrative co-operation as required; (v) unfair trading practices; (vi) infringements of the objectives of the arrangements concerning the conservation and management of fishery products.[23]

The GSP system has latest been revised in 2012 and significant changes went into place on the first of January 2014. Among the most important changes is a reduction in the number of beneficiaries to those most in need and an expansion of the number of 'non-sensitive' products eligible for duty-free access. The GSP+ system has further been strengthened, and the EBA, which has no expiry date, is maintained.[24]

[23] GSP preferences were withdrawn for Myanmar/Burma in 1997 due to serious and systematic violations of the principles of the International Labour Organisation (ILO) Convention on forced labour. Following the decision by the Conference of the ILO to lift its negative opinion on the country in June 2012, the EU reinstated GSP preferences for Myanmar/Burma in July 2013, with retro-active application as from June 2012.Iin June 2007 the EU withdrew its trade preferences to Belarus under the Generalised Scheme of Preferences, in response to Belarus' violations of the core principles of the International Labour Organisation.

[24] See European Commission (2012) "The EU's New Generalised Scheme of Preferences", for further details.

Appendix B

Table B.1: Time-varying effects of (discrete) trade liberalization on exports to the EU

	Dependent variable is log(Imports)		Dependent variable is a discrete import dummy	
	All products	Textile, apparel, and leather products	All products	Textile, apparel, and leather products
	(1)	(2)	(3)	(4)
GSP year 1	0.036***	0.082***	0.000	0.013**
	(0.007)	(0.027)	(0.002)	(0.006)
GSP year 2	0.042***	0.048	0.000	0.009
	(0.007)	(0.047)	(0.002)	(0.010)
GSP year 3	0.037***	0.025	-0.000	0.010
	(0.006)	(0.044)	(0.001)	(0.009)
GSP year 4	0.038***	0.044**	0.000	0.012***
	(0.005)	(0.020)	(0.001)	(0.004)
GSP year 5+	0.067***	0.046*	0.002***	0.009*
	(0.004)	(0.025)	(0.001)	(0.005)
EBA/GSP+ year 1	0.068***	0.089**	0.003**	0.013
	(0.006)	(0.036)	(0.002)	(0.009)
EBA/GSP+ year 2	0.080***	0.072**	0.007***	0.015*
	(0.006)	(0.034)	(0.002)	(0.008)
EBA/GSP+ year 3	0.094***	0.050	0.007***	0.005
	(0.007)	(0.032)	(0.002)	(0.008)
EBA/GSP+ year 4	0.099***	0.072**	0.007***	0.014*
	(0.006)	(0.033)	(0.002)	(0.008)
EBA/GSP+ year 5+	0.133***	0.020	0.011***	0.005
	(0.005)	(0.037)	(0.001)	(0.007)
Observations	15,408,646	3,119,556	15,408,646	3,119,556
R-squared	0.849	0.869	0.701	0.727
Country-product FE	yes	yes	yes	yes
Country-year FE	yes	yes	yes	yes
Product-year FE	yes	yes	yes	yes

Notes: Estimated in the same way as the results reported in Table 1, only adding interactions between the trade liberalization variables and the number of years ago tariffs declined (top-coded at 5 years). Standard errors are clustered at the country-product level. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***.

Table B.2: Time-varying effects of (discrete) trade liberalization on exports to the United States

	Dependent variable is log(Imports)		Dependent variable is a discrete import dummy	
	All products	Textile, apparel, and leather products	All products	Textile, apparel, and leather products
	(1)	(2)	(3)	(4)
GSP products year 1	0.027***		0.006***	
	(0.007)		(0.002)	
GSP products year 2	0.024***		0.007***	
	(0.007)		(0.002)	
GSP products year 3	0.045***		0.009***	
	(0.008)		(0.002)	
GSP products year 4	0.042***		0.010***	
	(0.008)		(0.002)	
GSP products year 5+	0.028***		0.005***	
	(0.007)		(0.001)	
Apparel provision year 1	0.018	-0.006	-0.001	-0.004
	(0.012)	(0.012)	(0.003)	(0.003)
Apparel provision year 2	0.094***	0.066***	0.006*	0.004
	(0.014)	(0.013)	(0.003)	(0.003)
Apparel provision year 3	0.196***	0.151***	0.021***	0.016***
	(0.017)	(0.016)	(0.003)	(0.003)
Apparel provision year 4	0.245***	0.195***	0.026***	0.022***
	(0.017)	(0.017)	(0.004)	(0.004)
Apparel provision year 5+	0.270***	0.185***	0.026***	0.019***
	(0.016)	(0.015)	(0.003)	(0.003)
Observations	12,856,448	3,100,768	12,856,448	3,100,768
R-squared	0.834	0.826	0.698	0.702
Country-product FE	yes	yes	yes	yes
Country-year FE	yes	yes	yes	yes
Product-year FE	yes	yes	yes	yes

Notes: Estimated in the same way as the results reported in Table 1, only adding interactions between the trade liberalization variables and the number of years ago tariffs declined (top-coded at 5 years). Standard errors are clustered at the country-product level. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***.

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