

What drives Africa's export diversification?

Dick Nuwamanya Kamuganga.¹

The Graduate Institute of International and Development Studies, Geneva

Abstract

What drives export diversification in Africa? The primary purpose of this paper is to seek empirical answers to this question. Using a highly disaggregated bilateral trade flows at HS 6 digit level for African countries for a period 1995-2009 and a conditional logit technique, I find 3 main empirical results. First, intra-Africa regional trade cooperation enhances the likelihood of an African nation exporting across the new-product, new-market margin. Second, I also find evidence that both product and market experience help to increase the chances of African exporters exporting on new-product and new market margins thus providing support for the learning effects hypothesis. The third result shows that infrastructure related trade frictions such as export costs; time to export; procedures to export as well as weak export supporting institutions have a negative effect on African export diversification. Similarly macroeconomic developments particularly exchange rate volatility, financial underdevelopments and inappropriate foreign direct investments hurt African nation's chances to diversify its exports. In policy terms this study suggests that for African exporters learning to export from regional markets before exploring major distant markets, a reduction in intra-African trade barriers, deepening and strengthening regional trade cooperation could be a significant channel for encouraging export diversification in Africa.

Key Words: Extensive Margin of trade, Firm Heterogeneity, unilateral trade preferences & regional trade agreements. JEL: F1, F13, F14, F15

¹ Department of International Economics, Graduate Institute of International and Development Studies, Pavillion Rigot, office R13, Avenue de la Paix 11A, 1202 Geneva. Email: dick.kamuganga@graduateinstitute.ch. Tel: +41788642348.

1.Introduction

Primary commodities, mainly mineral fuels, constituted 56 percent of the total African exports in 2009.² Why is the composition of African exports heavily concentrated in unprocessed primary commodities in contrast to other regions of the world – East Asia for instance?³

Shifting away from primary commodity exports remains an uphill task for almost all African countries. Yet successful economic transformation that guarantees wage employment requires these economies to move away from the enclave economies of single commodity exports into a diversified non-traditional basket of new products and new markets.⁴ If Africa is to take full advantage of its participation in international trade, it must upgrade its export basket composition, product quality and range of export markets.

A country's export diversification can occur through three major channels: new products to old markets; new products to new markets, and old products to new markets. This paper investigates empirically the underlying factors that drive Africa's export diversification along these three channels. It covers all African countries using trade data at HS 6 digit level of disaggregation.^{5,6}

The paper attempts to answer four related empirical research questions. First, how much of Africa's trade growth can be attributed to exports on the new-product, new-market margin? Second, does intra-African regional trade cooperation increase the likelihood of African nations exporting across the new-product, new-market margin? Third, do learning effects from exporting promote export diversification? And fourth, what are the other underlying factors that determine the probability that an African exporter will export a new product or export a product to a new market? I use a conditional logit technique to answer these questions and control for exporter-product-market and time fixed effects in all my specifications.

The paper's contribution is fourfold. It is the first paper to focus on the issue of whether intra-African regional trade cooperation enhances Africa's export diversification. Second, it explores how much of recent African export growth can be attributed to the export of new products and exporting to new markets (establishes some stylized facts on the significance of Africa's new products and new trading partners) between 1995 and 2009. Third, it reports the significance of learning effects in exporting activities along the new-product and new-market margins among African exporters. Fourth, it explores other factors that determine the probability that an African exporter will export a new product or export to a new market among African exports.

The paper presents three main empirical results. The first result is that intra-regional trade cooperation in Africa matters. It increases the likelihood of an African nation exporting on

2 Author's calculation based on UN COMTRADE database

3 That is the high performing East Asian countries of Hong Kong, S. Korea, Singapore, Taiwan and newest industrialising countries of Indonesia, Malaysia and Thailand-East Asian NICs.

4 I define traditional exports as those exports that constituted the top 10 exported products in 1995

5 African countries refer to the entire continent (Sub Saharan plus North Africa)

6 Regarding level of disaggregation, for African countries, 6-digit level is disaggregated enough to look at the changes in the numbers of products to give a convincing picture of diversification. I believe I will be able to pick up on individual products without underestimating the importance of the newly traded products in Africa because of the level of development in the region.

the new-product, new-market margins and significantly affects the export-basket composition. The second unambiguous result is that export experience matters. The discovery of new-varieties (products) and new-markets (new trading partners) is positively related to exporting experience. Third, is that policy and institutions can hinder export diversification. There is a negative and statistically significant relationship between the probability of expanding export margins and infrastructure related trade frictions, negative policy shocks, financial underdevelopment, inappropriate FDI and quality of bureaucracy supporting exporting activities within Africa.

This empirical evidence means that intra-African regional trade cooperation is also an important channel of Africa's trade growth and creating new opportunities for export diversification. The public policy implication is that emphasis should also be pressed on the reduction of intra-African trade barriers and strengthening of intra-Africa trade facilitation as a means to foster export basket expansion and overall export growth.

The rest of the paper is organised as follows in six sections. The next section reviews the literature. Section 3 present the prima facie evidence on African export performance over the last 15 years. Section 4 presents the theoretical framework and Section 5 presents the econometric analysis. The final section presents a brief summary and concluding remarks.

2.Literature

My empirical approach is motivated by heterogeneous firm theoretical framework, but before turning to a review of these models, I briefly consider the pre-Melitz work.

Before Melitz (2003), the microfoundations for the introduction of new varieties were not well developed. The models used in the early empirical work (e.g. Roberts & Tybout 1997) were loosely based on the existence of firm level sunk costs for entering new markets, but the competitive interactions were not well accounted for. For instance, Baldwin (1988, 1989), Baldwin & Krugman (1989), Dixit (1989a, b), and Krugman (1989) looked at sunk entry costs in settings that assumed simple market structures.⁷

Less closely related was the well-known model of Dornbusch, Fischer & Samuelson (1977) which presented a framework of a two country Ricardian model with a continuum of goods and extended it to analyse a many-commodity case. This framework focused on how changes in tariffs and transport costs could change the range of commodities that were traded. Later, Eaton & Kortum (2002) presented a Ricardian trade framework that permits analysis of bilateral trade flows along the absolute advantage, to comparative advantage (trade promoting) and to geographic barriers (resisting trade). In this framework, technological heterogeneity and geographic barriers determine which products various countries exported. Bernard & Jensen (1995, 1999) work showed that heterogeneity in firm productivity is systematically related to trade participation. That is within an industry, some firms export while many others do not and even among exporters, the fraction of shipments exported is often small. They also show that exporters are larger, more productive, and pay higher wages than other firms within the same industry.

⁷ Models of hysteresis of trade flows, this analysis emphasised such costs of breaking into foreign markets as upgrading product quality, packaging, establishment of marketing channels and acquiring information on foreign demand.

Since, I want to investigate the patterns of export diversification-new product and new-market margins for Africa's exports at product level, Melitz (2003) theoretical framework and its extensions provide a natural framework for my empirical investigations. Its two key empirical implications will help my investigations. First, it provides a natural, firm-level interpretation of why a particular trade flow between an African exporting country (origin country) and the destination country might not be observed.⁸ This is important since the traditional 'new trade models' of Helpman and Krugman (1985) made assumption that meant all varieties were traded – a feature that renders them useless for consideration of changes in diversification. The 'old' trade models before Helpman and Krugman went even further and assumed away firms and varieties of products all together. In this context, the Melitz model was the first flexible framework in which the number of products exported was a key focus of the theory. This is why I use this family of models as the backbone for my empirical estimation strategy.

Second, it provides a simple model of the determinants of which flows should be positive. Specifically, a typical product in Africa will be exported as a new product, if the exporting firm is productive enough⁹ to incur fixed costs of its production plus sunk and variable costs of entering a foreign market. While Melitz was a break through, it worked in an economic setting that was too symmetrical to inform my empirical work. Fortunately, there have been extensions to Melitz (2003) that include multiple destinations and multisector economic settings; here I review the most relevant (see Redding 2011 for a complete survey of the Melitz-inspired literature).

Helpman, Melitz and Yeaple (2004), develop a variant of Melitz (2003) by introducing multiple destinations and multiple sectors. Firms within sector are differentiated by productivity as in Melitz (2003) and can decide to serve either the foreign markets through exports or through local subsidiary sales. They face lower fixed costs if they export and lower variable costs if they invest. The key feature of this set-up relevant to this study is that multiple firms facing lower fixed costs (in multiple destinations) deciding to export can help explain the patterns of export diversification for African exporters.¹⁰ When applied for my purposes, this can be interpreted as providing determinants of African firms' choice on the extensive margin (new-product and new-destination margins). Bernard, Redding & Schott (2007) go beyond Helpman, Melitz and Yeaple by developing a framework with endowment differences across origin and destination countries in a heterogeneous firms setting. Their framework adds to the list of potential determinants of African extensive margins, namely as trade costs fall, firms in the nation's comparative advantage sector are more likely to export their product. It also shows that relative firm size and relative number of firms increases more in the comparative advantage industries. Freer trade, however, has the opposite effect in a nation's comparative dis-advantage sectors.

Finally, the theory paper most closely related to my empirical strategy is that of Helpman et al. (2008). This is a multi-country version of the Melitz (2003) model that is consistent with the kind of stylized features of the data used in this paper. The authors use their theory to

⁸ This setting provides an explanation for the change of trade along the extensive margin, i.e., the number of new products exported as a result of changes in cut-off condition for a typical product in a foreign market. Also changes in variable costs could affect firms' decisions in two ways: - first, new firms which previously could not export due to the higher variable costs start to sell also in the foreign market; Second, changes in the fixed costs of entering a new market impact trade also at the extensive margin thus permitting export diversification.

⁹ Has low marginal cost of production (its labour per unit output is high enough)

¹⁰ In the model firms sort according to productivity into different organisational forms

motivate a novel regression strategy related to the gravity equation. What makes their framework suitable for my analysis is that it permits positive as well as zero trade flows across pairs of countries, and it allows the number of exporting firms to vary across destination countries. Therefore permits me to investigate the impact of trade frictions on the Africa's extensive margin of trade (export diversification) i.e., number of exporters and destination markets.

These theoretical insights guide my main hypothesis on the causes of export growth on the new-product and new-market margin of African trade. With positive fixed exporting costs, and for significant large values of fixed and variable trade costs, a certain number of productive African firms will export certain products to certain markets. This results into a pattern of export diversification along the new-product and new-market margins. By implication, a reduction in the specific fixed exporting costs and variable trade costs, from changes in regional trade integration or destination country market access conditions or reduction in intra-Africa trade barriers, infrastructure related trade and information frictions should lead to African firms' discovery new products as well as new markets leading to export growth at the extensive margin.

Besides this strand of analytical literature offering insights on how firm characteristics and trade costs can impact export performance of an individual firm, the industry export performance and consequently the aggregate trade performance of a country, I review empirical literature that is closely related to the problem I investigate in the current study.

2.1. Empirics

The first modern attempts to understand the range of goods a nation exports came in the early 1990s. Feinberg (1992) using time series data for US manufacturing industries first tested the hysteresis hypothesis from the sunk-cost papers discussed above. He finds that exports became dispersed across destination markets as the dollar depreciated, suggesting that there was firm entry into new country markets. He reports weaker effects in industries where distribution networks with high sunk costs. However, Parsley and Wei (1993) focusing on bilateral US-Canada and US-Japan trade flows for very disaggregated commodities find that both the past history of US exchange rate changes and measures of exchange-rate volatility had no significant effect on trade flows thus contesting the findings of the hysteresis model.

The pre-Melitz empirical tests to data on trade flows and prices relied on aggregate or sectoral data. Roberts & Tybout (1997) pioneered the convergence of theory and empirics by developing an econometric model of plants' decision to diversify into new markets and used it to test the sunk-cost explanation for hysteresis of trade flows at plant-level. Using Colombian plant-level data for the period 1981-1989, the authors find evidence that sunk cost hysteresis models were empirically relevant and found that the probability that a firm will export, if it exported last period was significantly as high as 60 percent. Similarly Sullivan (1997), Bernard and Jensen (1999), Campas (1999) adopt a dynamic probit or logit technique to empirically test whether sunk entry costs affected export participation. Their universal finding was that sunk costs are important and that export aggregates were indeed subject to important hysteresis effects and that sunk costs matter for export participation.

Bernard and Jensen (1995, 2004) have also empirically provided substantial insights into the characteristics of exporting firms. They report that exporting firms tend to be more productive than non-exporting firms and that exporting process is very persistent and firms rarely change their status from non-exporting to exporters and vice versa. Das, Roberts and

Tybout (2008) found that sunk costs are quantitatively more important for small scale exporters among Colombian Chemical producers whose foreign demand is relatively limited, suggesting that hysteresis effects are important only for fringe players in the export markets.

In Bernard *et al* (2003), the most productive firms out-compete others and export by incurring both the market entry costs including transport costs associated with international trade. In Bernard *et al* (2006) industries experiencing relatively large declines in trade costs exhibit relatively strong productivity growth and the relatively high-productive non-exporters are more likely to start exporting in response to falling trade costs while existing exporters increase their shipments abroad as trade costs fall. They further provide evidence of productivity growth within firms in response to decrease in industry-level trade costs. Eaton *et al* (2011) simulate using a method of moments an extended version of the Melitz model based on French trade data by firm and destination market. They report that number of exporting firms selling to a market increases with market size; secondly, export sales distributions are similar across markets of very different size and extent of French participation and third, average sales in France are higher for firms selling to less popular foreign markets and to more foreign markets. Baldwin & Harrigan (2011) focussing on the pattern of zeros in product-level bilateral trade data show that “export zeros” are correlated with distance and destination market size. They also show that high quality firms are the most competitive, with heterogeneous quality increasing with firms heterogeneous cost.

2.1.1. Empirics on origin country characteristics and export diversification

Evenett & Venables (2002), Feenstra & Kee (2004), Hummels & Klenow (2005) and Felbemayer & Kohler (2006) have shown that there is a difference in product varieties countries export in a range of countries and these patterns change over time. Hummels and Klenow (2005) find that export elasticity with both per capita income and market size is due to the extensive margin three-quarters and one-third due to the intensive margin. They report that within a category of the 60 poorest countries, those with twice the GDP per worker export 39 percent more quantities at unchanged prices, whereas doubling GDP per worker among the 61 richest countries leads to 39 percent higher prices for the same quantities shipped. Thus, they point that a country’s trade participation evolves along the course of its development. Dutt, Mihov & Van Zandt (2011) and Christodoulopoulou (2010) have shown empirically that there is an increase in the extensive margin of trade with respect to regional trade agreements and WTO membership. Similarly Foster, Poschl and Stehrer (2010) also report trade creating effects of preferential trade agreements and much trade creation takes place along the extensive margin. Rose (2000) found large statistically significant effects of currency unions on international trade and a small negative effect of exchange rate volatility. He notes that two countries that share the same currency are likely to trade three times as much as they would with different currencies. Also Barro & Teneyro (2007) report positive effects of a common currency on international trade. Baldwin & Di Nino (2006) report positive and significant effects of the euro on trade, the authors provide a supportive evidence of the “new-goods hypothesis”.

2.1.2. Empirics on destination characteristics and export diversification

These papers Baldwin & Harrigan (2011), Kang (2006), Campbell and Hopenhayn (2005) in different contexts have shown that the destination country market size matter for exporting large number of varieties. Intuitively, for any given pair of trading countries, the number of varieties exported to a particular country should be positively related to the size of its effective demand or its income per capita, thus the finding that rich countries should import more varieties. Baliamoune-Lutz (2010) investigates growth effects of Africa's trade with China using Africa's trade flows for a period of 1995-2008 and finds evidence supporting the "growth by destination" hypothesis. This implies that destination of exports can play an important role in determining the country's trade patterns as well as its development trajectory. The author also notes that inward foreign direct investments can be a channel to influence trade patterns of a developing country's exports, especially for FDI targeting specific export sectors. Bernasconi (2009) analyses the two extensive margins of international trade flows using Linder Hypothesis¹¹. The author finds that countries with more similar demand structures also have a higher probability to exhibit positive trade via product level extensive margin.

2.1.3. Empirics on trade barriers and export diversification

Debaere and Mostashari (2010) investigate the role of tariff changes and tariff preferences on the changes in the range of goods that the United States imports from its trading partners. Their strategy was to compare trade patterns that occurred in 1989 and those that occurred in 1999. They report significant changes in the extensive margin of US imports between the beginning and the end of their sample period but find that these changes can only be in part accounted for by tariff reductions and tariff preferences. Farazi Binti (2011) shows that greater economic integration in East Asian economies led to export diversification but exchange rates and tariff rates had a negative effect on diversification.

Gamberoni (2007) found that European unilateral trade preferences had anti-diversification effects along with concentration of exports in agricultural sector for the case of ACP preferences. However, Frazer and Van Biesebroeck (2010) report positive results using a triple difference-in-difference estimation technique for AGOA beneficiaries on the extensive margin. Specifically, they find product categories grew largest where tariffs removed were largest, but smaller though significant impact for agricultural products.

Amurgo Pacheco (2006) investigates the Euro-Mediterranean Preferential Trade Agreement (PTA) effects on range of products exported by member nations using disaggregated HS 6 digit level data and his results reveal a positive expansion in the range of products traded by its members providing empirical evidence for his "new varieties hypothesis" that free trade agreements lower costs of entering a foreign market for exporting firms and thus lead to a drop of zeros in export sectors especially in the most liberalized sectors. Similarly Amurgo-Pacheco and Pierola (2008) report positive effects of FTAs and trading with North countries contributing to export diversification of developing countries.

¹¹Linder Hypothesis: This predicts the intensity of trade to increase with the similarity in demand structures & that the more similar per capita incomes are the more diversified are the traded good bundles. Also the more uneven the within income distribution is the higher is the extensive margin of trade.

2.2. Empirics on geography and export diversification

McCallum (1995), Anderson & Wincoop (2003) and Evans (2003) indicate that international borders do indeed play a role in determining the patterns of international trade. Overall, their results indicate that international borders significantly reduce trade between countries. I expect countries that share borders to trade more at the extensive margin in this analysis.

Bernard et al (2007) demonstrate the negative effects of distance on trade flows by finding that the number of exporting firms is strongly decreasing in distance (but increasing in destination market size), but the export value per product and firm increases with distance. Furthermore, Baldwin and Harrigan (2011) confirm a strong positive association between distance and “zero exports”.

Frankel *et al.*, (1995) inter alia have also shown that geography is also a powerful determinant of bilateral trade flows, implying that simply knowing how far a country is from other countries provides a considerable information about the amount of trade activity it performs at the extensive margin.

3.Data and Prima facie evidence

To fix ideas and establish the unconditional facts to be explained in my regression analysis, this section provides an overview of Africa’s export activities for the period 1995 to 2009 including intra-African trade performance. I use bilateral trade data at 6-digit level based on Harmonised System (HS) of classification. The data is obtained from BACI dataset based on UN COMTRADE database. This description involves export performance in terms of changes in the export basket along the old-and new-product margins and destination markets (old and new-market margins)

3.1. Geographical Distribution and overall Africa’s Export Performance

African exports grew at an average of 11 percent during the sample period (Table 1) but fell drastically in 2009.¹² Intra-Africa regional trade grew faster as well at 12 percent for the first 14 years, intra- Africa trade constitutes what I have called the non-traditional markets for African exports. In this group of markets, African exports grew fastest for Latin America (14 percent), Middle East (13 percent), and Asia (13 percent). In traditional markets, North America (United States and Canada mainly), African exports grew at 13 percent annually and 10 percent for Europe.

For all destinations, African exports grew fastest in the mid-2000s reflecting the upturn of commodity prices and international demand conditions for African commodities of 2004 till 2006. During this period (2004 to 2006) African exports grew remarkably at 21 percent per annum. This double digit growth rates sustained in the past few years resulted in average annual growth rate of 25 percent since 1995. However, the growth rates declined in all

¹² Exports fell close to 60 percent in 2009. This could possibly be a reporting problem in 2009 or it reflects the on-going global financial crisis.

regions in a synchronized fashion in 2007 following the financial crisis. Though in all regions, African exports rebounded to double digit growth averaging remarkably at 27 percent in 2008.

In terms of growth of regional market shares (Table 3), a number of significant changes can be noticed regarding regional distribution of African exports in the last 15 years. In the rich traditional markets of African exports composed of Canada, Europe, Japan and the United States (the traditional QUAD countries) imported 76 percent of African exports in 1995 but this share shrunk to 63 percent. This is also the largest unilateral preference trade between Africa and its partners. In this category of markets, Europe has been the largest African traditional market; it constituted 56 percent of overall export market in 1995 which shrinks to 41 percent (by 15 percent) by the end of the sample period. While North America (United States and Canada) share of imports from Africa expanded by a mere 2 percentage points ((15 percent in 1995 to 17 percent in 2009). Within the traditional markets, the USA the most single significant destination of African exports expanded its share of imports from Africa from 13.7 percent in 1995 to 15.7 percent in 2009. France followed within Europe and its share which was 10 in 1995, shrunk to only 7.5 percent. Within Europe also Italy, Germany and Britain ranked among the top 5 destinations of African exports in 1995 but their share shrunk from 9.8, 7.8 and 5.8 to 8.6 4.8 and 3.7 percent respectively (see Table 4 for distribution of African exports by top 20 destination markets). Japan share as one of the main markets for African exports within the QUAD shrunk from 4.2 percent in 1995 to only 2.4 percent in 2009. Exports to Canada rose from 1.1 percent in 1995 to 1.7 percent in 2009.

In the non-traditional traditional markets Africa's share of exports to Asia expanded by a remarkable 8 percent in the last 15 years from 14 percent to 22 percent. African exports grew fastest particularly to China which gained the leading significance as the destination of African exports with its share rising from 1.0 percent in 1995 to take the second rank as Africa's export destination at 10 percent in 2009. A remarkable 900 percent growth in share of export by value destined to China. In non-traditional markets its share rose from 3.1 percent, as a 9th major African market to the 1st major market with 21.6 percent share of imports from Africa among non-traditional markets. The second most important market for African exports in non-traditional markets is India, Africa's export share to India rose from 1.8 percent in 1995 to being the 5th most important market at 5.2 percent in 2009. India is followed by Switzerland as the other major African non-traditional market. Its share rose from 1.2 in 1995 to 2.3 percent, a 92 percent increase in significance for this market. Also Brazil in the non-traditional markets grew, African exports to Brazil rose from 1.4 percent in 1995 to 2.1 percent in 2009.

Within the rest of non-traditional markets, intra-Africa trade increased by only 3 percentage points from 9 percent share to 12 percent. The main markets of intra-African exports were led by South Africa, Equatorial Guinea, and Nigeria with 1.7, 1.0, and 0.9 percent share respectively. These were the only intra-African markets in the top 20 markets of non-traditional African markets (Table 4) in 2009. For the major intra- African market, Zimbabwe constituted the largest market by share of African exports at 12 percent of intra-African exports, followed by South Africa at 8 percent, then Mozambique, Ivory coast, Tunisia at 7, 6 percent respectively in 1995 as the top 5 markets for intra-African exports. By the 2009, the major intra-African markets were South Africa (15 percent), Equatorial Guinea (8 percent), Nigeria (7.4 percent), Zimbabwe (6 percent) and Zambia (5 percent). Overall, intra-African exports have progressively become more significant and less reliant on the traditional QUAD markets.

Overall, at least three stylized facts can be noted from this section; first, the share of exports to traditional markets (the QUAD) has shrunk from 76 percent to 63 percent over the sample period. Second, African exports to non-traditional markets rose from 24 percent to 37 percent, with exports to Asia leading the expansion. Third, intra-African trade become significant for the first time in the post-colonial period. It rose at 12 percent per annum and accounted for 12 percent of total African exports in 2009. It also reveals that intra-African export expanded more along the new-product margin than the new-market margin and the reverse is true for the ROW exports. Below, I will interpret all three points in the light of new-product, new-market margins.

3.2. Within Regions Distribution of African Exports

Table 5, Table 7 & Table 8 provides further evidence that Africa's export growth can also be significantly attributed to intra-Africa product diversification as well as to increasing significance of non-traditional markets as major destinations of African exports. First, the total African markets (the total number of destination markets increased from 127 at the beginning of the sample to 151 in 2009. Second, the average number of markets per exporter rose from 57 markets in 1995 to 78 markets in 2009. Third, while in 1995 each product was being exported to an average of 31 markets, in 2009 the average number of destination markets per product had reached to 49 markets.

To get a more quantitative handle on the degree of concentration of African exports by destination markets (and its evolution) I do compute the normalised Herfindahl–Hirschman Index (HHI) over all destination market of African products. The HHI for market diversification is:

$$HHI_t = \left(\frac{\sum_{j=1}^n x_{jt}^2 - n^{-\frac{1}{2}}}{1 - n^{-\frac{1}{2}}} \right)^{1/2}$$

where x_{jt} is the share of the destination market j in total African exports for each year, t , and n is the total number of markets for each year. HHI ranges from 0 to 1, with higher values indicating more concentrated geographic patterns.

Figure 1 displays the evolution of HHI for markets and varieties for Africa. It shows that there have been significant gains in variety diversification as well as geographical diversification during the sample period. The HHI has slightly decreased from 0.41 in 1995 to 0.28 in 2009 but in between oscillates around 0.35 for markets for instance.

3.3. Export basket composition-Africa's non-traditional export performance

Table 6 shows the export basket composition with product categories corresponding to the HS 2 digit level, revision 1992. The export basket composition for all African countries at this level of aggregation seems to have remained relatively stable over the sample period under study, with mineral fuels as leading exports for all destinations including intra-African trade. The other 5 major exports from Africa include: (i) mineral fuels (55.7 percent); (ii) precious stones (6.2 percent); (iii) ores, slag and ash (2.8 percent); (iv) cocoa and cocoa preparations

(2.4 percent); (v) Electrical machinery equipment parts (2.2 percent). These top five commodities accounted for 69.3 percent of African total exports for the year 2009 and 78.8 percent for the top 10 exported commodities exported from Africa.

Most notable changes in the export basket composition, is the rapidly increasing share of mineral fuels both in volume and value for the last 15 years, which accounted for less than 37.4 of total exports in 1995 but increased to their current share of 55.7 percent of total African exports in 2009. This rapid rise of mineral fuels follows a rise of the number of African countries discovering and initiating exploitation of oil products in the last 10 years, new petroleum exporting countries increased their participation in total exports by almost 60 percent since 1995.

At the beginning of the sample period coffee, tea, spices ranked the 5th most important export, but it has been losing its participation in total exports over the years and its position went down and was not in the top 10 exports in 2009. Precious metals and mineral ores show resilience in all traditional markets constituting the second most important exports by proportion to traditional markets and some non-traditional markets like India.

Again concentration of Africa's export basket composition can be quantified with the HHI defined for products. This focuses on the distribution of shares of products; again HHI is 1 if only one product is exported, and 0 if an infinite number are. I notice a slight reduction in the degree of concentration of the export basket as confirmed by the HHI for product exports that slightly decreased from 0.48 in 1995 to 0.13 in 2009 (Figure 1) shows the variation of non-traditional exports and their HHI index at HS2 and HS 6). These statistics show that the composition of the structure of African exports during 1995 to 2009 gradually changed in the export basket product or chapter composition.

3.4. New product and new market margins

In this sub-section I decompose African export performance on the extensive margin into new-product (number of active product lines) and new-market (number active destinations) margins. For each margin, I analyse the contribution of each toward Africa's export growth over the sample period.

First, I split African export performance into 3 main product categories – those that are new, those that disappear, and those that are exported throughout the sample period. Second, I define new products at the HS 6 digit level and set a 'window' for the definition of 'new'. The point is to address the possibility that produce which is exported every other year would be considered a 'new' product each time. To filter out such hit and run exporting, I set the window for a product to be considered 'new' to (1, 2, 3, 4, and 5) years.¹³ These thresholds reduce the sample size from over 15 million observations for the years 1995-2009 to within the range of 1.6 million observations points. This helps me capture the changes induced by the explanatory variables shocks under study and offer robustness checks for my analysis.

¹³ On hit and run exporting see Békés and Muraközy (2012).

3.4.1. New products

NP1- is a new product k in the sample if it was not exported anywhere in any of the thresholds I impose on the sample. This means it was not exported either in the preceding 1,2,3,4 or 5 years before this product is first exported and then its exported consecutively in the next 1,2, 3,4 or 5 years. The paper chooses these thresholds on the basis of the fact that export spells in Africa are likely to be short-lived but also for robustness checks on what constitutes a new product¹⁴; besides, African exporters are more likely to face uncertainty, imperfect information on foreign demand so their export activity is by trial and error on different products for a short while after incurring sunk costs of reaching a new foreign market¹⁵.

NP2- is a new product k if it was positively exported to destination market- d in 2009 and was not exported (zero flow) in 1995.

NP3- is a new product k if it was positively exported to destination market- d in 2009 and its value was larger than US\$ 1000 dollars, and its value was equal or less than US\$ 1,000 dollars in 1995.

NP4- is a new product k if it was positively (an active line) exported to destination market- d in 2009 and its value was larger than US\$ 5000 US dollars and it was equal or less than US\$ 5000 dollars.

I start my investigation of changes at the new-product and new-market margin by looking at the total African exports regardless of the exporting country and of destination market, and I then proceed to a country-level analysis by looking at exports established products to countries the products had not yet been exported to.

Table 7 shows the number of new products in 1995-2009 as well as their shares in the total number of products exported in the sample period, for 6 digit product lines. All African trade relationships are recorded in my dataset regardless of export value. Following the four windows for defining products as new, I find on average 630 new products were discovered annually for the entire sample period. This means considering all export destinations, and all exporters, just a small proportion of the potentially exported products were active product lines in 1995. The value of these exports represented an annual average of 37 percent in share of total African exports and 46 percent by share in 2009.

The performance of African countries on these margins varies per country and per destination; with new products it's significant large for traditional markets like Europe but less pronounced for other major distant rich markets. Exports to India, USA, Great Britain, Italy, German and France (with 49 new products) emerged as the leading destination for Africa's new products (see table 7) for the top 20 destination markets for new products). The second major destinations for new products are Hong Kong, Malaysia, China (48 products), Canada, Austria, Netherlands and Japan (47 products). For the intra-African new-product margin, only South Africa, with its 46 new products were exported in 2009, is among the top 10 destinations for new products. Within other regions, EU has the largest share of new products created. This is noteworthy since it does not seem in line with the widely held perception that unilateral trade preferences have had no effect.

¹⁴ To reduce noise due to volatility in reporting within the data
¹⁵ See (Besedes and Prussa, 2006) for export survival insights.

For most of intra-regional groupings, new products represented 18 percent for intra-African trade, 4 percent for North American trade, 17 percent for Asia, 15 percent for region Middle East, 23 percent for Latin America, 23 percent for Oceania and the Pacific and 9.6 percent for the European Union markets Table 9 shows regional variation in number of new products and shares of new products in total regional trade and their ranks). Table 10 takes different views of the data by separating African nations into coastal and landlocked nations.¹⁶ The table shows that coastal countries (Kenya, South Africa, Egypt, Morocco, Senegal, Madagascar, Tunisia, Ghana, and Nigeria) experienced a significant trade growth on the new-product and new-market margins. Landlocked countries, by contrast, saw less expansion along the new-product margin compared to the coastal countries, but they still saw important growth (four times more at the end of the sample). The largest increases in new products was seen by Kenya, South Africa, and Ghana, although Ghana's big improvement is from a very low base.

3.4.2. Disappearing products

Disappearing products are those products that were exported somewhere in those threshold proceeding years but were not exported again within the window set. Since many trade flows occur at very low levels – suggesting that the exports are not really commerce – I set a threshold for an observed product-destination pair to be considered a ‘real’ exports (as opposed to, say, a family posting a present to an overseas family member).¹⁷ The thresholds I work with are \$0, \$1000, and \$5000. Table 7 also shows the number of disappearing products by destination and regional variation and exporting country. In overall African exports disappearing products constituted an annual average share of 23.2 percent.

3.4.3. Permanent products

Lastly, permanent products are those that were exported in all those threshold periods I choose for my analysis (from the beginning of the sample 1995 to the end of the sample period 2009). Table 7, also shows the summary statistics of permanent products for the sample period. By presenting permanent products as products which had already been exported somewhere by African exporters over the thresholds, I do control for variation in product code reclassifications. In overall, African exports, the permanent products contributed an average of 41.6 percent per year.

3.4.4. New market margin

3.5. Data quality issues

The quality of trade flow dataset may be undermined by at least two factors and therefore results need to be viewed in this prism. First, unreported or underreporting of trade data by

¹⁶ One third of the economies on the continent are landlocked countries whose trade and development depend on events beyond their own borders.

¹⁷ That is product k is a disappearing product if 1) it was exported to destination market- d in 1995 and 1996, but 2) its exports in 2008 or 2009 were below the threshold of zero dollars, \$1000, and \$5000.

customs officials due to limited institutional capacity to report regularly may be endemic among African countries. Second, erratic reporting would also affect the analysis in the sense that an erratically reported product may appear as a new product in the analysis, yet it was simply undeclared trade previously. I take account of these two factors in the analysis in the following way:

For the first problem, I rely on the improved data set by BACI database, which attempts to solve the problem of underreporting and erratic reporting by using mirrored data. BACI data uses mirror data based on the most reliable trading partner. This quality would partially alleviate measurement errors that may correlated with the main explanatory variable¹⁸.

The second step, I impose thresholds (time windows) in the definition of a new product-destination export, both for the number of years of duration of this export and the number of years since it was first exported. Specifically, I define two time windows:

- Y_o : The first year of a new product-destination is exported at least Y_o after the beginning of sample.
- Y_T : The new product-destination is exported at least for Y_t years. These years might not be consecutives.

Table 10 shows examples of country-pair product sub-samples that meet the minimum requirement for the least demanding thresholds ($Y_o=1$, $Y_t=1$) and the most demanding thresholds ($Y_o=5$, $Y_t=5$) that I will use in my empirical specification. This procedure helps me to filter the data though does not completely solve the problem of estimating the probability of products with high hazard rates (low rates of survival), but it helps in terms of interpreting the results as a true new exported product thus overcoming the simple measurement errors.

While the use of these time windows to filter the data will not completely solve the problem of estimating the probability of products with low rates of survival, at least it helps in terms of interpreting the results as a true new exported product instead of simple measurement error.

The other potential problem (limitation of my data) worthy of noting on the quality of the data is that infrastructure related trade frictions data for African countries is only available for the years 2004-2009. I have therefore built panels for only 6 years with the analysis of these covariates. This implies that I have further reduced my T & N within my panels. Further still the product level tariff data does not yield good results and therefore, I have excluded market access analysis within the current research.

To take account of movement in relative prices during the sample period 1995-2009, I deflate GDP to yield real GDP variables.

4.Theoretical Framework

This section turns the theoretical framework that forms the backbone of my empirical approach. Following Melitz (2003), Helpman, Melitz and Yeaple (2004), and Helpman et al

¹⁸ See Gaulier, G. & S. Zignago (2010) “BACI: International Trade Database at the Product-level The 1994-2007 Version”

(2008), I adopt a simplified version of heterogeneous-firms trade model by Baldwin (2005) to structure my empirical work on margins of trade. This framework helps since it allows for explicit consideration of “zeros” in the export matrix.

The basic ingredients of this framework are well known. Each exporting firms is associated with one exported varieties; firms are heterogeneous in their marginal costs of production, and markets are heterogeneous in fixed market-entry costs. The natural result is that not all firms export to all markets, i.e. the range of varieties exported is endogenous and is determined by each firm`s marginal cost and market-specific entry costs.

4.1. The Model Set Up

For simplicity, the model works with Dixit-Stiglitz monopolistic competition and a distribution of firm-level marginal costs generated by a probability distribution (Helpman, Melitz and Yeaple 2004). Since the intermediate steps are well known, I turn directly to the fulcrum of the model, namely a typical firm`s cut-off conditions since this governs whether the firm sell to the various markets.

For the African firm to sell in its own market it will depend on its ability to meet the marginal cost to produce a variety and still sell a variety at zero profit at least i.e., break even. Therefore, all firms that cannot breakeven will exit the market. Therefore for producing for the domestic market, the cut-off conditions as defined as follows:¹⁹

$$F_o^D = \left(\frac{\bar{a}_{oo}}{1-1/\sigma} \right)^{1-\sigma} \frac{B_o}{\sigma} \quad (1)$$

Where F_o^D is the cost of entering the domestic market, \bar{a}_{oo} defines the cut-off marginal cost (or productivity) for selling a variety in the domestic market, $\sigma > 1$ is the constant elasticity of substitution among varieties. B_o is the demand shifter in the African exporter`s market and is equal $\frac{E_o}{P_o^{1-\sigma}}$ where E_o is the total expenditure in the domestic market and P is the domestic CES price index for all varieties sold domestically.

Among the African firms that produce for their domestic markets, there will be some firms with high productivity (low marginal cost) that will export to destination markets. These firms will, on top of covering the marginal cost of producing a variety, be able to cover the costs of foreign market-entry. Therefore the exporting cut-off condition is:

$$F_d^X = \left(\frac{\bar{a}_{od}\phi_{od}}{1-1/\sigma} \right)^{1-\sigma} \frac{B_d}{\sigma} \quad (2)$$

Where F_d^X is the fixed cost of exporting to destination market, \bar{a}_{od} is the cut-off marginal cost for exporting to destination market-d, $\phi_{od} \equiv (1 + \tau_{od})^{1-\sigma}$ is the ‘freeness’ of trade between exporting nation-o and destination nation-d countries (τ_{od} is the bilateral trade friction), B_d is the demand shifter in the foreign destination market defined analogously to E_o .

¹⁹ See Melitz (2003), Helpman, Melitz and Yeaple (2004), Baldwin (2005) and Helpman, Melitz and Rubinstein (2008) for details of these calculations. The notation is from Baldwin (2005).

These cut-off conditions determine which firms export to which markets and thus define the zeros in the African trade matrix. Thus, African firms that export to destination market-d from origin nation-o are defined by:

$$v_{od} = \begin{cases} \left(\frac{a\phi_{od}}{1-1/\sigma}\right)^{1-\sigma} B_d, & a \leq \bar{a}_{od} \\ 0, & a > \bar{a}_{od} \end{cases} \quad (3)$$

Using standard CES demand functions and the cut-off conditions, it is easy to show that the total bilateral exports equal:

$$V_{od} = \begin{cases} \phi_{od}^{1-\sigma} B_d \left(n_o \int_0^{\bar{a}_{od}} a^{1-\sigma} dG[a/\bar{a}_{oo}] \right) \left(1-\frac{1}{\sigma}\right)^{\sigma-1}, & a \leq \bar{a}_{od} \\ 0, & a > \bar{a}_{od} \end{cases}, \quad (4)$$

This is the expression for bilateral trade volume, where $G[a/\bar{a}_{oo}]$ defines the conditional density function, that is G is cut at \bar{a}_{oo} as a typical African firm will only export a variety conditional on being able to produce it at home. As is well known, this is the basis of gravity-like estimation of extensive margins. That total expenditure of the destination market on varieties can be proxied by its GDP. Also the GDP of the exporting African country can be proxy for n_o i.e., the exporter's endowment. ϕ_{od} represents the bilateral freeness of trade (bilateral trade costs).

This set-up helps to explain a number of observable features of the bilateral trade exports for African countries particularly changes along the new-variety and new-market margin (Africa's extensive margin of trade) in a number of ways. First, change in the cut-off conditions for a variety, leads to changes in new-product (variety margin) for the African exports. Second, changes in the market-entry fixed costs, leads to both changes in new-variety and new-market margin for African exports. Third, Intra-regional trade cooperation in Africa could increase the freeness of trade between parties to free trade agreements by reducing border duties on imports, reducing other trade related frictions at the border including border delays and documentation. That is if the fixed costs of entering a regional market falls, then a wider range of varieties will be exported to within this market.

These frictions constitute both the variable and fixed costs of exporting within the region. And a reduction in these costs could result into positive effects for creation of trade along the new-variety and new-market margins. That is new firms that were previously unable to export could begin to export within the region creating both the new-variety and new-market margins of trade within the region. Similar reasoning can be applied with multilateral liberalisation of trade across the board in reducing variable costs incurred by African exporting firms.

The empirical section also considers export-learning effects which are outside the model. Informally, however, the cut-off conditions in the model help clarify how reductions in exporting firms' marginal costs (stemming from learning-by-exporting) could affect the extensive margin in other markets and varieties.

These testable implications can be summarized as follows:

- First, a decline in fixed cost to export F_d^X and increase in freeness of trade (reduction in variable trade costs) ϕ_{od} within intra-Africa and its trading partners leads to discovery of new-varieties and new-markets by African exporting firms.

- Second, higher export profits as a result of declining fixed costs F_d^X and increase in freeness of trade ϕ_{od} in regional markets, reduces the productivity threshold for exporting, thus increasing the discovery of new-varieties, and new-markets.²⁰.
- Third, as multilateral, inter-regional, bilateral, unilateral liberalisation takes foot, so should new markets and new products rather than unilateral preferences merge for Africa diversified products that would change the trade patterns of Africa.

The empirical work uses equation (4) to investigate the effect of regional trade agreements on African exporters discovering new-varieties and new-markets. The strategy is to focus on the bilateral trade flows that switch from zero to a positive value for each potential destination (210) markets and also changes within the existing trade flows i.e., existing varieties to new markets or new products to existing markets. This switch is defined at exporter-product-market level.

5. Empirical Analysis

This section turns the empirical analysis of the questions presented in Section 1. Specifically, a switch from a zero to a positive entry in the export matrix – either at new-variety level or at new-market level – is taken as the definition of export diversification. When looking at the effects of the intra- Africa regional trade agreements as well as other underlying factors in determining some of Africa`s bilateral trade relationships switching from zero to positive values, the idea is that these variables affect the extensive margins by lowering marginal costs or market entry costs. A key hypothesis is that intra-Africa regional trade cooperation boosts the probability of observing a product switch from zero to positive (discovery of a new-variety or discovering a new-market). I also associate infrastructure related trade frictions, bureaucratic frictions, policy shocks, financial underdevelopment and weak institutions with a negative probability of observing a product switch from zero to positive trade flow.

5.1. Model Specification: Estimation Equations

Therefore my empirical strategy aims to provide evidence for my three related hypothesis:

H1: The likelihood of discovering a new-variety or new-market increases with an African country`s membership in an Intra-regional trade cooperation

H2: The likelihood of an African exporter discovering a new-variety or a new-market increases with the exporters experience in the regional markets and markets in the rest of the world

H3: The likelihood of an African exporter discovering a new-variety or new-market declines with presence of infrastructure related trade frictions, policy shocks, financial underdevelopment, inappropriate FDI and weak institutions supporting exporting activity

For each of these hypotheses, I estimate the change in the likelihood of discovering a new-product k exported from origin country-o to an existing market-d (or to newly discovered

²⁰ See Bigsten et al (2003) “Do African Manufacturing Firms Learn from Exporting?” University of Oxford

market-d) with respect to membership in an intra-regional trade agreement as well others to other control (underlying factors) variables as specified. I estimate the following equation using a conditional logit technique.

$$\Pr(V_{k\text{od}t} = 1/V_{k\text{od}t-1} = 0) = G(\beta_0 + \beta_1 RTA_{\text{od},t} + \beta_2 K_{-}V_{\text{o},t} + \beta_3 X_{\text{d},t} + \beta_4 X_{\text{od},t} + \beta_5 \tau_t) \dots \dots \dots (5)$$

Where $G(*)$ is the logistic cumulative distribution function, $V_{k\text{od}t}$ takes a value of 1 if a product k (at HS 6 digit level) that was not previously exported from origin- o African country to destination- d market in the range period Y_o starts being exported in year t and is exported at least Y_T years (the thresholds Y_o and Y_T is being defined in section 3.5 above).

The effect of intra-regional trade cooperation will be tested with the parameter β_1 , given for the variables, Monetary Union, Common Market, Customs Union, and Preferential Trade Area (PTA) as a dummy taking a value of 1 if the country-pairs are in each of these regional groupings. It also indicates in some specifications the number of years the country-pair has effectively been in a regional trade agreement²¹. That is, this variable has two specifications: a dummy variable to proxy if two trading partners are in regional trade agreement and a set of dummies for each year after the regional trade agreement has been in force. If **H1** is true, I expect β_1 to be positive and statistically significant. I include a measure of export experience defined at product level and market level, which is export experience, is exporter-product specific or exporter-market specific. If **H2** is true, I expect β_2 to be positive and statistically significant.

For testing hypothesis **H3**, I include measures of infrastructure related trade frictions, policy shocks, financial underdevelopment, inappropriate FDI and weak institutions supporting exporting activity for African origin country $X_{\text{o},t}$, and if **H3** is true, I expect β_3 to be negative and statistically significant.

The rest of the variables in Equation 1 are time-variant controls at different levels. I include the natural log of the sum of the exporting and importing country GDP, natural log of the absolute difference in exporter and importing country GDP, the sum of GDP per capita and the absolute difference in GDP per capita to capture the effects of changing market size (see Baldwin & Harrigan (2011) for instance) effects of level of development (See Hummels and Klenow, 2005). I also include the control for trade openness for both the exporter and the importing country. I estimate each specification separately for intra African trade, and Africa's trade with the rest of the world as well as the full sample for the period 1995-2009. I also include a time trend, τ_t . Some of the conventional time invariant determinants of bilateral trade flows are not included because my empirical technique inherently directly deals with such controls as geographical distance, common language, and common border or land-lockedness. I cluster robust standard errors by country-pair-product level.

5.2. Econometric issues and caveats

There are at least four specific econometric problems that warrant concern in interpretation of my results. First, regional trade agreements are potentially endogenous, indeed whether

²¹ The intra-regional trade agreements include those notified by the parties to the WTO, they obtained from WTO RTA database accessed here <http://rtais.wto.org/UI/PublicAllRTAList.aspx>

regional governments sign a regional trade agreement or not may depend on how many products are traded and the potential for expansion. In an extreme case (see Grossman and Helpman 1995), trade agreements are only signed when there is trade diversion and not when there is trade creation. If RTAs are endogenous, my empirical estimates on new-products or new-markets may be biased and the effects of RTAs on the extensive margin may be seriously over-or-under-estimated²². I have not been able to find a clean solution for this potential endogeneity problem in the current version of the paper^{23,24}. However, I do believe my use of country-pair fixed effects should be able to deal to a great extent with this problem (see Baier & Bergstrand: 2004; 2007) on use of panel data techniques to deal with endogeneity.

The second potential econometric problem in my empirical analysis is that most of my covariates do not vary at product level but rather at country level, which would have warranted the use of aggregate level data rather than product level or transaction level variation. However, I implement exporter-product-market fixed effects, but also the results need to be understood as an approximation as I face a trade-off between the loss of information that is contained at product level and the efficiency of my estimates.

The third plausible limitation with my approach is that my unit of analysis is the exporter-product-market level (dyadprod), so the structure of the errors may not be homoscedastic. To correct this problem of heteroscedastic errors, I cluster the standard errors at the dyadprod level in all specifications.

The fourth econometric caveat is that my conditional logit estimates cannot reveal the quantitative effects of the change in the covariates on the likelihood of exporting across a new-product margin or new-market margin. Future research will be devoted on quantifying the economic effects of the change in covariates on the likelihood of exporting across a new-product, new-market margin in the next version of the paper.

5.3. Empirical Results and Discussions

As earlier stated, the paper tests three key hypotheses: 1) whether intra-Africa's regional trade cooperation increases the likelihood of an African country exporting on the new-product, new-market margin; 2) whether export experience increases the likelihood of an African exporter exporting on new-product, new-market margin i.e., whether exporting activity is subject to learning effects; and 3) whether infrastructure-related trade frictions and/or market access challenges decrease the likelihood of an African country exporting on new-product, new-market margin i.e. whether Africa's export concentration is correlated with infrastructure-related trade frictions and/or market access challenges.

²² See Baier & Bergstrand (2007) for detailed treatment of endogeneity with FTAs (more interestingly in their results they find that on average, an FTA approximately doubles two members bilateral trade after 10 years).

²³ I am exploring use of instrumental variables (IV) approach following Arcand, Olarreaga and Zoratto (2010) use as determinants of PTAs

²⁴ See Egger and Larch (2007) for details in the solutions to the problem of interdependence of FTA membership (i.e., in Baldwin and Jaimovich deal with this problem by using lagged values of the contagion index to alleviate a great deal of the potential problem of endogeneity that arises from spatial dependency of FTA formation]

Results on hypothesis **H1** are presented the tests in Table 12, namely the results for the effects of an RTA on the likelihood of African countries exporting across a new product-destination pair limiting the study to products that have been exported somewhere in the past two years. In the columns 1-3, I report estimates for the new-product margin while in columns 4-6, I report estimates for the new-market margin. For each of the margins, I show the effects with full sample in 1st column, intra-African sample (only African countries) in 2nd column, and rest of world sample in the 3rd column respectively. The findings for each margin show that intra-regional trade arrangements namely the monetary union, common market, customs union do positively affect the likelihood of African nations exporting across a new-product margin as well as a new-market margin. Interestingly, the probability is higher for monetary union and customs union but negative for a weaker form of integration namely preferential trade agreements (PTAs). The standard errors are estimated by both clustering at dyadic level and two-way country level. In terms of inference, these results are always statistically significant when errors are clustered at dyadic level.

For other controls, all the conventional measures of economic size-market size are statistically significant with dyadic level of clustering of standard errors. The results show that an increase in real GDP per capita for both exporter and the market tend to increase the probability of an African nation exporting on the new-product, new-market margin. In literature this control variable reflects the economic size of the trading partners. It reflects the available income to spend on a number of varieties from African exporters; the larger the economic size the higher the probability that African countries will export new varieties. For brevity purposes these results are not reported here.

Among the other control variables, the absolute GDP per capita difference between the African exporting nation and destination market-d as included to capture different levels of development. In some specifications, the coefficient on GDP per capita difference is negative implying that the richer the market, the less likely an African nation will export to this nation a new-variety. However, this result is not robust. If I take this variable to reflect differences in consumer preferences and technology for African trading partners, it's possible that a wide gap in GDP per capita could reflect difference tastes and preferences of quality products from Africa. Therefore, a negative coefficient signifies that rich nations consider African products inferior and therefore lowers the probability of an African nation exporting its new-product to these nations. For example, rich countries consumers besides negative quality perception, they may be biased against African products or towards the goods produced in their own countries.

Interestingly absolute difference in exporter-importer GDP has a negative effect on the probability to export on the new-product margin but not on the new-market margin- that is reducing the chances to export to a new product line, indicating a possible difference in quality preference between rich and poor inhabitants i.e., the "economic distance" between the trading partners can depict the quality premium of exports. That is the larger the absolute difference between the market GDP and the exporter GDP, the less likely for an African nation to export new products to this market probably because of differences in quality, tastes and preferences between the two countries. When I run the specification by region, the absolute GDP difference changes sign to positive for intra-African sample. This could signify that small income differences in Africa and thus closely related consumption preferences-that is possibly African countries import similar or can afford similar products imported from each other. This result is also reflected in the prima facie evidence in the description of data on the evolution of the number of traded products and number of trading partners.

The other control variable of interest to note is the measure of trade openness; I included the total bilateral trade between the exporter and importer as a control for trade openness. Its coefficient is positive as expected. From literature, previously exported products have a positive influence on the probability that an exporting African nation will export a new product or to a new-market.

Table 13 presents results for the test of hypothesis **H2** for the impact of exporting experience on the likelihood of exporting across a new-product and new-market. Like before, columns 1-3 indicate results for the new-product margin and columns 4-6 indicate results for the new-market margin with full sample, intra-African sample and the rest of the world samples. It can be seen that β_2 the parameter for exporting experience [which is both exporter-product specific and exporter-market-product specific]. The result shows that export experience matters for increasing likelihood to export a new product. The coefficient is positive and statistically significant for all specifications (robust). This would imply that African exporters learn by exporting i.e., confirms the presence of learning effects on the new-product, new-market margins (Africa's extensive margin of trade). That is a product exported in a previous market is a launching pad for a new market. The magnitudes and significance of β_1s are similar to those described in table 10, and for other controls, they are all generally statistically significant and maintain their signs in both specifications-for new-product and new-market margins and with the same inference strategy i.e., clustering standard errors at the dyadic level.

For testing of hypothesis **H3**, I include a variety of measures for infrastructure induced frictions in estimating equation 5. These include costs to export, the cost of doing business, time to export or transit delays. I also include measures policy shocks or policy uncertainty such as exchange rate volatility, a measure of financial underdevelopment, FDI flows as well as the measure of the quality of export supporting bureaucracy. Table 14 presents the estimates for β_3 parameters in equation 5.

For infrastructure induced trade frictions as well as the bureaucratic frictions, results are as expected and robust in all specifications. As expected coefficients on costs to export, cost of doing business, time to export or transitional delays as well as the measure of quality of export supporting bureaucracy carry a negative but always statistically significant coefficients.^{25 26} These results imply that the higher these infrastructure related trade frictions and bureaucratic frictions, the less likely the African nations to export across the new-product, new-market margin²⁷. Columns 1-3 report the results for the new-product margin and columns 4-6 report results for the new-market margin. Columns 1& 4 report the full sample specification results. Columns 2 &5 reports intra-African sample specification and column 3&6 report for the rest of the world (ROW) sample specification. In all these specification, costs to export, time to export, and cost of doing business do have anti-diversification effects along the new-product and new-market margin. Overall these results suggest that a reduction in these kinds of fixed costs for African exporters can play an important role in diversifying and expansion of African exports and trade partners.

²⁵ See the appendix for how these measures are calculated (Source: WDI, 2011)

²⁶ The nature of transit delays are that they could be increasing the transaction costs facing exporting firms in Africa.

²⁷ Earlier studies like Bloom and Sachs (1998) had argued that Africa's true comparative advantage was in manufactures and services but this could only be realised only in Africa's coastal regions, since transport costs in the interior were too prohibitive for trade.

Measures of policy induced trade frictions are also carrying the right or expected signs, are always statistically significant at least 5 percent level. In these I have included exchange rate volatility to proxy policy shocks due to macroeconomic management among African nations. This covariate has a negative coefficient and always statistically significant. It suggests that exchange rate volatility has an anti-diversification effects on both new-product and new-market margins. Largely these results support the hypothesis that exchange rate volatility reflects macroeconomic mismanagement in most African countries that makes their export sector uncompetitive in international markets²⁸. In previous work, Elbadawi (1998) emphasises the influence of exchange rate misalignment on manufactured exports.

Within this category of variables, I also find that financial underdevelopment in Africa has deleterious effects on export diversification along the new-product, new-market diversification. This covariate is the ratio of private credit over GDP for each exporter. In all specifications, it's always statistically significant and with a negative sign. The negative correlation implies that financial underdevelopment among African countries is not supportive for entrepreneurial activities leading to start-ups in the exporting new products or to new markets. A deepening of financial services supporting export participation is not observed in many of the African countries especially private credit, provided to more enterprises and households to initiate new economic activities.

The other covariate worthy noting in the specification is the FDI. The sign of its coefficient is negative but switches in some of the specifications. It's not robust, but always statistically significant. It indicates ambiguous effects of the FDI inflows. Overall, it carries a negative sign signifying that FDI inflows in Africa diminish the likelihood of an African nation exporting across a new-product, new-market margin. Rodrik (2006) among others have argued that government's FDI policy is a key reason why China can export products that are associated with a technology level that is much higher than a country at China's level of income.

Similarly, the measure of bureaucracy induced frictions (or measure of quality of export supporting bureaucracy) is negative and statistically significant in all specifications. I use polity index for this covariate as a measure of quality of bureaucracy or institutions supporting export activities in African countries. The negative correlation signifies that the quality of institutions in Africa affect negatively the probability of exporting across a new-product, new-market margin. Other studies, though in different frameworks has indicated that indeed institutions matter for trade flows²⁹.

As a measure of trade policy changes, I included product level tariff in specification of equation 5. This is to control for any change in market access conditions. The covariate is simple average of applied MFN tariff for product k in destination market-d. The sign of the coefficient on the covariate is negative and statistically significant but sensitive to different specifications reflecting lack of robustness. But also reduces the size of the sample significantly because of the quality of data at this level. But overall, higher tariffs do significantly reduce the chances of exporting across a new-product, or new-market margin.

²⁸ Bigsten et al. (1999) finds limited evidence that firms respond to real exchange rate variation for a sample of African countries (though a short period was used in the investigation)-macroeconomic policy changes which changes the real exchange rate will benefit those firms which export, it will reduce the profitability of firms which are intensive users of imported inputs, which should explain why it's difficult for African firms to achieve vertical diversification or quality upgrading.

²⁹ See Anderson and Marcouiller (2002), Caldeira Cabra and Veiga (2010) among others.

5.4. Robustness Tests

In the first robustness test, I run a linear probability estimate using the concentration indices for the products and for the markets respectively (Table 15 and Table 16) as the dependent variable i.e., testing whether determinants of likelihood to export are also determinants of export concentration or market concentration. Results are strikingly qualitatively similar as those obtained by the conditional logit technique with the new-product, new-market margins.

I repeat the exercise, this time testing my hypotheses using the number of products each country exports as a dependent variable (for product diversification) and the number of markets each exporter exports to (for market diversification), I once again produce the qualitatively similar evidence for the three hypotheses (Table 16).

In the third test I change the thresholds in Table 12, in columns 1-3 we restrict the sample to a product not being exported in the last 2 years conditional on the fact that is exported in the consecutive next 2, 3, 4, 5 years. The results do not change for Regional trade cooperation variables. Except for intra-Africa trade when the restriction is for a product line to have been exported at least for 3 years, the coefficient on intra-Africa RTA is negative but not significant. For space considerations, I have not included robustness checks results here.

6. Concluding remarks

This paper explores the empirical determinants of export diversification by African nations. The unconditional evidence shows that diversification of African exports seems to mostly occur at the new-product margin within Africa and at new-market margin with the rest of the world as new-and old products. Specifically, 35 percent of the total export growth during 1995-2009 can be explained by the trade of new-product margin and 10 percent by the new-market margin for trade flows disaggregated at the 6 digit level. Intra-African trade growth on the new-product margin contributed 18 percent of the total trade growth on the new-product margin, while contributing 4 percent, on new trading partner's trade growth (i.e., trade growth resulting from the new-market margin) during 1995-2009 within Africa. The average number of new products discovered in intra-African markets is 232 per year relative to 365 new-products to non-African markets discovered during the sample period. Additionally, the average trading partners in intra-Africa trade are 40 (out of 53 potential trading partners) while the average trading partners for non-African markets is only 94 (out of 157 of potential trading partners) in 2009. This implies that for overall changes in the number of exported products, intra-African region new-product and new-market margin contributed significantly to the overall export growth of the new-product & new-market margin created during the sample period, making intra-African regional trade a crucial channel for Africa's export expansion and diversification.

Turning to regression results that control for many covariates, there are three main results. First, I find a statistically significant correlation between a nation's participation in intra-African trade cooperation and export diversification. Participation in customs unions and monetary unions are found to boost the probability of new product-destination pairs, while participation in weaker forms of integration, namely preferential trade arrangements (that often involve little liberalisation) tends to have the opposite effect. These results hold for both the new-product and new-market margins. Similar evidence is reported by Beine & Coulombe (2007) for Canadian-U.S. Free Trade Agreement at industry SIC 4 level data and

Christodouloupoulou (2010), Foster *et al.* (2010) at product (HS 6 digit) level. Also in a broader framework and controlling for endogeneity, Baier & Bergstrand (2007) report that FTAs on average doubles two members' bilateral trade. Implying these results are consistent with literature on the impact of FTAs on trade flows.

Second, I show that exporting experience matters for Africa's export diversification. African exporters learning by exporting and both product and market experience help to increase the chances of African exporters exporting on new-product and new-market margins. This result provides evidence for the support of the learning effects hypothesis.

Finally, I present evidence that shows infrastructure-related trade frictions have a negative effect on African export diversification, where such frictions are measured by: costs to export, time to export, documentation to export, and transit delays. Again the frictions have negative effects on both the product-margin and destination-margin. This confirms on African data, findings that have been shown by Freund & Rocha (2010) and Brenton *et al.* (2011).

I also show macroeconomic development affect the probability of new product and new destination exports, specifically exchange rate volatility, financial underdevelopment, and inappropriate foreign direct investment inflows. Poor quality institutions also lower the likelihood of observing an expansion along the new-product and new-market margins.

Future research is needed to sharpen the policy recommendation that might follow from this research. In particular it would be important for future research to explore further which features of regional trade cooperation promote African export diversification i.e. efforts can be devoted on a systematic investigation on which characteristics of an RTA and its members determine the extent to which export diversification increase within the region.

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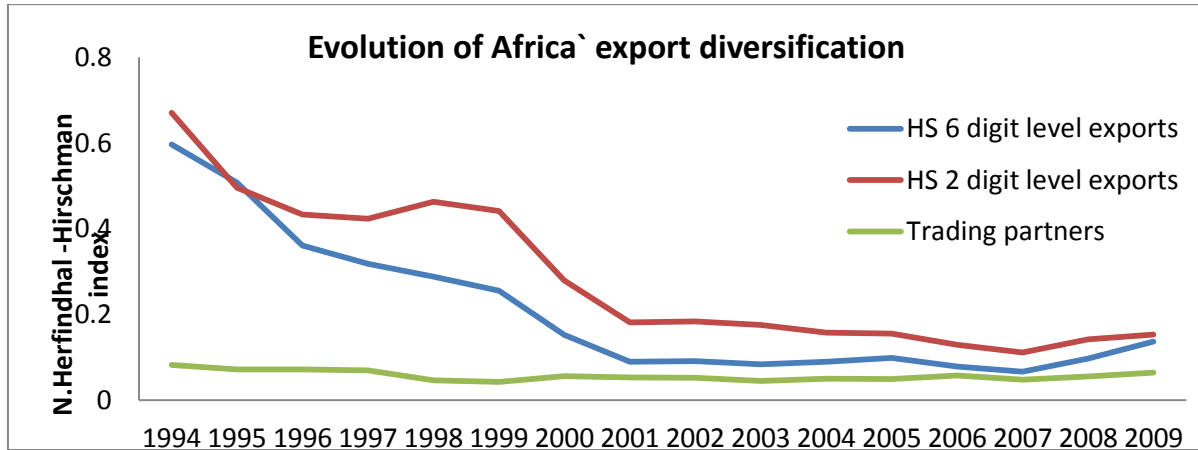
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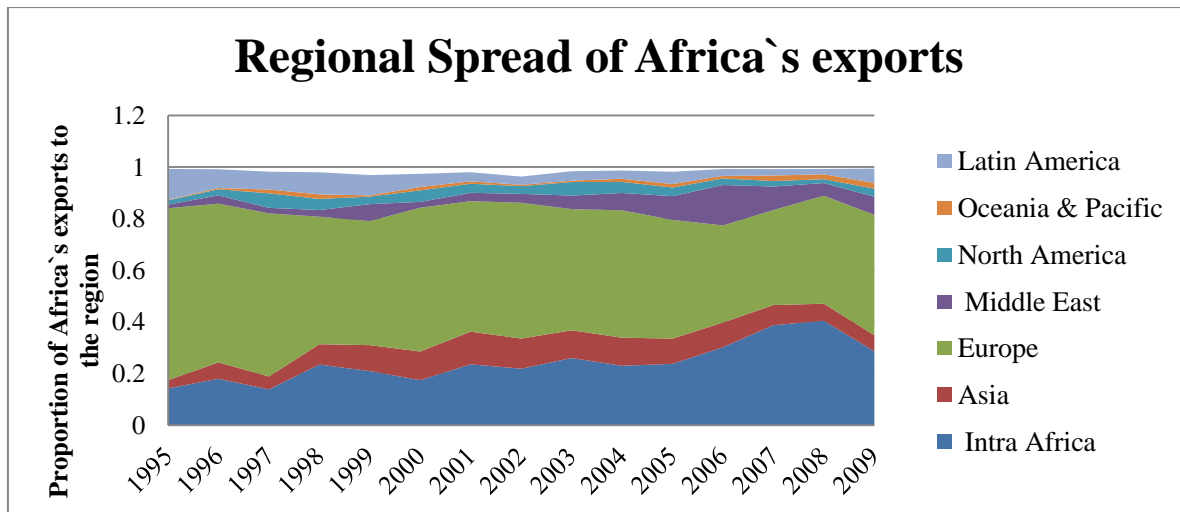
Appendix 1: Figures and Tables

Figure 1: Evolution of Africa's export diversification indices



Notes: This figure shows a slight improvement in a diversification of both the exported products and destination markets over the sample period

Figure 2: Evolution of Africa's regional exports



Notes: This figure shows a slight improvement in regional distribution of African exports with intra-African markets (in blue) gaining significant market share as well as Latin America and the Middle East markets.

Table 2: Regional trade growth rates 1996-2008

Year	Total all destinations	Intra-Africa	N.America	Asia	Middle East	Latin America	Oceania & Pacific	Europe
1996	14	15	17	10	23	26	24	12
1997	2	-1	6	14	6	9	5	-3
1998	-14	-5	-20	-33	-7	-10	-15	-11
1999	8	4	7	26	13	12	20	4
2000	25	12	40	19	21	33	48	23
2001	-8	3	-18	-14	-7	-14	-92	-5
2002	4	13	-7	10	-8	-17	40	6
2003	17	16	29	19	19	16	-2	12
2004	20	15	28	21	28	37	30	16
2005	24	26	30	20	29	25	19	20
2006	19	20	19	30	9	17	-8	17
2007	13	15	13	16	19	21	2	9
2008	25	26	22	29	28	26	33	24
Annual average	11	12	13	13	13	14	8	10

Notes: This table summarizes the growth rates of African exports by region (7 different regions) over the sample period.

Table 3: Overview of regional share (%) of African trade

year	Intra-Africa	North America	Asia	Middle East	Latin America	Oceania & Pacific	Europe
1995	9	15	14	3	2	0	56
1996	10	15	13	4	3	1	54
1997	9	16	16	4	3	1	52
1998	10	15	13	4	3	1	54
1999	10	15	16	4	3	1	51
2000	8	18	15	4	4	1	50
2001	9	17	14	4	3	1	52
2002	10	15	15	4	3	1	52
2003	10	18	16	4	3	1	50
2004	9	20	16	4	3	1	47
2005	10	22	15	5	3	1	45
2006	10	21	18	4	3	1	43
2007	10	22	18	4	4	0	42
2008	10	21	19	5	4	1	41
2009	12	17	22	4	4	1	41

Notes: This table shows the regional share of African exports. The largest market for African exports has been the European Union, followed by North America (United States and Canada), Asia and Intra-African trade

Table 4: Distribution of African exports by main destination markets (%)

Rank	1995	2000	2005	2009
1	USA	13.7	USA	17.2
2	France	10.0	Italy	10.2
3	Italy	9.8	France	7.8
4	Germany	7.8	Spain	6.5
5	Britain	5.8	Britain	6.5
6	Spain	5.5	Germany	6.1
7	Belgium	5.1	India	3.8
8	Japan	4.2	Belgium	3.4
9	Netherlands	3.6	Japan	3.0
10	S.korea	2.0	China	3.0
11	India	1.8	Netherlands	2.8
12	Portugal	1.5	Brazil	2.2
13	Hong Kong	1.5	Turkey	1.9
14	Brazil	1.4	S. Korea	1.8
15	Switzerland	1.2	Switzerland	1.7
16	Turkey	1.2	Portugal	1.2
17	Canada	1.1	Canada	1.2
18	Zimbabwe	1.1	South Africa	0.7
19	Taiwan	1.0	Taiwan	0.6
20	China	1.0	Saudi Arabia	0.6
Total proportion of top 20				
		80.5	82.3	82.5

Notes: This table shows the major destination of African exports by share considering a five year moving average. United States remains the most single important market, recently followed by China.

Table 5: Distribution of African exports-Non-traditional partners

1995		2000		2005		2009		
Rank	Market	share (%)	Market	share (%)	Market	share (%)	Market	share (%)
1	S.Korea	6.2	Indonesia	11.3	China	18.2	China	21.6
2	India	5.6	China	8.9	Brazil	5.8	India	11.5
3	Hong Kong	4.8	Brazil	6.5	Turkey	5.7	Switzerland	5.1
4	Brazil	4.5	Turkey	5.5	Indonesia	4.9	Brazil	4.7
5	Switzerland	3.9	S. Korea	5.2	Switzerland	4.3	South Africa	3.8
6	Turkey	3.8	Switzerland	4.9	South Africa	3.9	Turkey	3.4
7	Zimbabwe	3.5	South Africa	2.0	S. Korea	3.1	S. Korea	2.7
8	Taiwan	3.1	Taiwan	1.9	UAE	2.0	Equ. Guinea	2.1
9	China	3.1	Saudi Arabia	1.9	Saudi Arabia	1.9	Nigeria	1.9
10	Saudi Arabia	2.5	Hong Kong	1.8	Zimbabwe	1.6	Zimbabwe	1.5
11	Austria	2.5	Singapore	1.7	Australia	1.6	Hong Kong	1.4
12	Thailand	2.4	Isreal	1.7	Ivory Coast	1.6	Zambia	1.4
13	South Africa	2.3	Greece	1.7	Nigeria	1.6	Greece	1.3
14	Greece	2.3	Zimbabwe	1.7	Thailand	1.4	UAE	1.3
15	Singapore	2.0	Ivory Coast	1.5	Indonesia	1.4	Saudi Arabia	1.3
16	Mozambique	2.0	Indonesia	1.5	Zambia	1.3	Ivory Coast	1.2
17	Isreal	1.9	Thailand	1.4	Greece	1.3	Indonesia	1.2
18	Ivory Coast	1.8	Austria	1.4	Chile	1.3	Algeria	1.1
19	Tunisia	1.8	Ghana	1.4	Hong Kong	1.2	Mozambique	1.0
20	Indonesia	1.5	Mozambique	1.3	Morocco	1.2	Malaysia	1.0

Notes: The table shows the most important non-traditional markets for African exports. China has emerged from being the 9th major market among the non-traditional markets to becoming the most important non-traditional market with a share of 21.6 percent.

Table 6: Africa`s export basket composition (%) by HS 2 digit level exports

Rank	1995		2000		2005		2009	
1	Mineral fuels	37.4	Mineral fuels	49.9	Mineral fuels	54.6	Mineral fuels	55.7
2	Natural/cultured pearls,	8.7	Natural/cultured pea	9.9	Natural/cultured pea	7.5	Natural/cultured p	6.2
3	art of apparel & clothing	4.2	art of apparel & cloth	3.3	Iron & steel	3.1	Ores, slag & ash.	2.8
4	Iron & steel	3.7	Iron & steel	2.5	Ores, slag & ash.	2.2	Cocoa & cocoa pre	2.4
5	Coffee, tea, spices	2.8	Ores, slag & ash.	1.9	art of apparel & clot	2.2	Electrical mchny ec	2.2
6	Ores, slag & ash.	2.5	Fish & crustacean	1.8	Electrical mchny equ	1.9	Nuclear reactors, b	2.0
7	Wood & articles of woo	2.4	Electrical mchny equi	1.7	Vehicles	1.7	Vehicles	2.0
8	Cotton	2.3	art of apparel & cloth	1.7	Nuclear reactors, bo	1.7	Iron & steel	2.0
9	Fish & crustacean	2.2	Wood & articles of w	1.6	Cocoa & cocoa prep	1.4	art of apparel & cl	1.9
10	Inorgn chem; compds of	2.2	Nuclear reactors, boi	1.6	Fruits & nuts, peel of	1.4	Copper & articles c	1.6
11	Cocoa & cocoa preps	2.2	Fruits & nuts, peel of	1.4	Wood & articles of v	1.3	Fruits & nuts, peel o	1.5
12	Fruits & nuts, peel of cit	1.9	Cotton	1.4	Inorgn chem; compd	1.3	Inorgn chem; comp	1.1
13	art of apparel & clothing	1.7	Coffee, tea, spices	1.3	Fish & crustacean	1.3	art of apparel & cl	1.1
14	Copper & articles of	1.7	Cocoa & cocoa preps	1.3	art of apparel & clot	1.3	Fish & crustacean	1.0
15	Nuclear reactors, boiler	1.5	Inorgn chem; compds	1.3	Aluminium & articles	1.2	Fertilisers	0.8
16	Electrical mchny equip p	1.4	Vehicles	1.2	Copper & articles of	1.1	Aluminium & articl	0.8
17	Salt; sulphur; earth & st	1.3	Aluminium & articles	1.1	Salt; sulphur; earth &	0.9	Wood & articles of	0.8
18	Fertilisers	1.1	Salt; sulphur; earth &	1.0	Cotton	0.8	Salt; sulphur; earth	0.8
19	Sugar and sugar confect	0.9	Tobacco	0.8	Coffee, tea, spices	0.8	Coffee, tea, spices	0.7
20	Tobacco	0.9	Fertilisers	0.6	Ships, boats & floati	0.7	Vegetables & certa	0.7

Notes: This table shows the composition of African exports (top 20 exports by value) at HS 2 digit level. It shows the dominance of Mineral fuels constituting approximately 56 percent in 2009.

Table 7: New-Product margin and its contribution to African exports 1995-2009

year	New Product margin	% of new Products	% of intra-Africa new products in new product margin	Disappearing Products	% of disappearing products	Permanent products	% of permanent products
1995	411	37	16	267	24	351	39
1996	429	35	18	278	23	351	42
1997	469	40	13	304	26	351	34
1998	496	37	20	322	24	351	39
1999	516	33	18	335	22	351	45
2000	552	39	15	359	26	351	35
2001	556	27	21	361	18	351	55
2002	617	30	23	401	20	351	50
2003	675	30	24	438	20	351	50
2004	689	31	18	447	22	351	47
2005	772	35	17	501	24	351	41
2006	788	31	22	512	20	351	49
2007	868	38	18	564	25	351	37
2008	928	38	21	603	25	351	37
2009	739	46	24	480	30	351	24

Notes: this table shows the evolution of the new-product margin of African trade-the new product margin as well as the share of the new products in the export growth

Table 8: New-market margin and its contribution to African exports 1995-2009

year	New Market Margin	% of New Market Margin	% of Intra-Africa New market Margin	Av. Number of Intra African Markets per exporter	Av. Number of Row markets for African exports	Average number of destination markets for each product
1995	7	11	3	37	90	31
1996	8	13	2	35	94	33
1997	9	14	2	36	97	36
1998	9	15	3	40	97	37
1999	9	12	3	40	99	38
2000	10	9	2	37	99	40
2001	10	12	2	39	99	40
2002	11	13	2	44	101	43
2003	11	12	2	43	106	46
2004	12	12	3	40	109	47
2005	13	9	2	37	103	49
2006	13	8	2	39	109	49
2007	14	7	2	44	109	51
2008	14	6	1	46	106	53
2009	13	8	2	44	107	49

Notes: this table shows the evolution of the new-market margin of African trade-the new market margin as well as the share of the new markets in the export growth in Africa

Table 9: Top 20 Destinations markets for new products

Rank	market	New Products
1	India	49
2	United States	49
3	Great Britain	49
4	Italy	49
5	France	49
6	Germany	49
7	Hong Kong	48
8	Malaysia	48
9	China	48
10	Canada	47
11	Austria	47
12	Netherlands	47
13	Belgium	47
14	Japan	47
15	Pakistan	46
16	South Africa	46
17	Ireland	46
18	Czech Republic	46
19	Switzerland	46
20	Australia	45

Notes: This table shows the top 20 most important markets and the average new products discovered annually across the sample period.

Table 10: African exports at extensive margin within and outside Africa: Country level analysis

Intra- Africa trade					Products to the rest of the world					
Rank	exporter	Number of products	exporter	Number of Products	Rank	exporter	Number of Products	Rank	exporter	Number of Products
1	South Africa	4492	S. Africa	4327	1	S. Africa	4085	1	S.Africa	3942
2	Zimbabwe	2490	Kenya	2207	2	Egypt	2878	2	Egypt	2757
3	Kenya	2006	Egypt	2074	3	Tunisia	2171	3	Morocco	2648
4	Tunisia	1467	Tunisia	1919	4	Morocco	2163	4	Tunisia	2581
5	Egypt	1442	Tanzania	1894	5	Mauritius	1478	5	Mauritius	1578
6	Ivory Coast	1370	Mauritius	1845	6	Zimbabwe	1089	6	Nigeria	1281
7	Morocco	1157	Morocco	1722	7	Kenya	975	7	Madagascar	1212
8	Nigeria	1071	Zambia	1664	8	Ivory C.	966	8	Kenya	1090
9	Mauritius	897	Uganda	1561	9	Nigeria	866	9	Tanzania	1057
10	Zambia	791	Zimbabwe	1332	10	Madag.	798	10	Senegal	1002
11	Malawi	773	Ivory Coast	1277	11	Algeria	698	11	Ethiopia	954
12	Cameroon	741	Senegal	1235	12	Ghana	649	12	Cameroon	885
13	Togo	701	Moz.	1021	13	Cameroon	540	13	Iv. Coast	877
14	Uganda	611	Ghana	904	14	S.Leone	467	14	Algeria	836
15	Djibouti	431	Malawi	824	15	Tanzania	454	15	Ghana	755
16	Benin	370	Algeria	766	16	Senegal	450	16	S.Leone	711
17	Madagascar	364	Madag.	674	17	Guinea	432	17	Mozamb.	658
18	Tanzania	358	Nigeria	641	18	Zambia	424	18	Zambia	516
19	Ghana	357	Ethiopia	503	19	Ethiopia	390	19	Zimbabwe	498
20	Niger	343	Rwanda	493	20	Togo	384	20	Seychelles	482
21	Algeria	338	DRC	389	21	Sudan	354	21	Niger	449
22	Burkina Faso	335	Burkina F.	354	22	Uganda	332	22	Sudan	442
23	Senegal	311	Angola	274	23	Niger	320	23	Mali	417
24	Libya	281	Togo	270	24	Mali	315	24	Gabon	407
25	Congo Br.	240	Cameroon	260	25	Libya	293	25	Uganda	400
26	Mozambique	202	Gabon	256	26	Congo B.	292	26	Angola	374
27	DRC	195	Gambia	243	27	Gambia	292	27	Libya	361
28	Guinea	182	Djibouti	215	28	DRC	271	28	Burkina F.	345
29	Gambia	170	Mali	213	29	Seychelles	270	29	Congo B.	338
30	Mali	150	Burundi	186	30	C.Africa R.	247	30	Liberia	330
31	Sudan	123	Sudan	174	31	Burkina F.	240	31	DRC	306
32	Central AF.R.	114	Congo Br.	174	32	Liberia	227	32	Malawi	305
33	Eritrea	100	Libya	161	33	Malawi	227	33	Guinea	299
34	Seychelles	84	Niger	136	34	Gabon	217	34	Gambia	244
35	Ethiopia	83	S. Leone	136	35	Mauritania	204	35	Mauritania	244
36	Gabon	81	Somalia	128	36	Mozamb.	203	36	Togo	238
37	Burundi	80	Benin	115	37	Angola	203	37	Rwanda	235
38	Liberia	75	Comoros	113	38	Burundi	147	38	Djibouti	229
39	Rwanda	68	Guinea	109	39	Benin	143	39	Chad	222
40	Sierra Leone	62	Mauritania	94	40	Somalia	125	40	C. Africa.R	214
47	Cape Verde	24	Liberia	30	47	Eritrea	64	47	Burundi	125
48	Sao Tome. P.	16	Sao Tome.P	30	48	Chad	58	48	Eq. Guinea	111
49	Eq. Guinea	15	Cape Verde	29	49	Eq. Guinea	50	49	Guinea-B.	106

Notes: This table shows the country level analysis for the evolution of the extensive margin of trade by country.

Table 11: Example of exporter-market-product data for the different thresholds

Threshold YO=1 & YT=1					Threshold YO=5 & YT=5				
year	product	exporter	market	trade	year	product	exporter	market	trade
1996	10119	AGO	USA	0	1995	130231	UGA	ZAF	0
1997	10119	AGO	USA	1	1996	130231	UGA	ZAF	0
1998	10119	AGO	USA	0	1997	130231	UGA	ZAF	0
1999	10119	AGO	USA	0	1998	130231	UGA	ZAF	0
2000	10119	AGO	USA	0	1999	130231	UGA	ZAF	0
2001	10119	AGO	USA	0	2000	130231	UGA	ZAF	1
2002	10119	AGO	USA	0	2001	130231	UGA	ZAF	1
2003	10119	AGO	USA	0	2002	130231	UGA	ZAF	1
2004	10119	AGO	USA	0	2003	130231	UGA	ZAF	1
2005	10119	AGO	USA	0	2004	130231	UGA	ZAF	0
2006	10119	AGO	USA	0	2005	130231	UGA	ZAF	1
2007	10119	AGO	USA	0	2006	130231	UGA	ZAF	0
					2007	130231	UGA	ZAF	0

Notes: This shows the time windows (thresholds) I use to define new products (mainly to clean the data and remove potential sources of noise in the data)

Table 12: Effects of intra-Africa trade cooperation on the new-product and new-market margins

	New-Product margin- Product diversification			New-market margin: Market diversification		
	Full sample	Infra Africa	ROW	Full Sample	Intra Africa	ROW
Monetary Union	0.178*** (0.007)	0.335*** (0.010)		0.297*** (0.007)	0.323*** (0.009)	
Common Market	0.204*** (0.011)	0.007 (0.013)		0.015 (0.013)	0.208*** (0.014)	
Customs Union	0.783*** (0.022)	0.933*** (0.023)		0.598*** (0.019)	0.648*** (0.019)	
Pref. Trade Area	-0.250*** (0.010)	0.003 (0.037)	-0.376*** (0.013)	-0.459*** (0.010)	-0.292*** (0.038)	-0.559* (0.012)
Observations	14785320	5710170	9075150	10199340	4297545	5901795
Significance	* p<0.10	** p<0.05	*** p<0.01			

Notes: This table shows the effects of intra-Africa trade cooperation on the likelihood of exporting across a new-product, new-market margin. All intra-regional covariates have an expected signs and are significant except the coefficient of PTA, which has a negative sign and though statistically significant. Also all other covariates had expected signs and are significant but are not reported for brevity purposes. A positive coefficient signifies that the change in a covariate enhances a chance of an African exporter exporting at the new-product/market margin. Robust standard errors are in parenthesis, and clustered at dyadprod level. All regressions include exporter-product-market fixed effects (country-pair product fixed effects) and time fixed effects. ***significant at 1%, ** significant at 5%, and * significant at 10%. All results report coefficients instead of marginal effects.

Table 13: Effects of export experience on the new-product or to a new-market margin

	New-product margin: Product Diversification			New-market margin: Market Diversification		
	Full Sample	Intra Africa	ROW	Full Sample	Intra Africa	ROW
Monetary Union	0.129*** (0.011)	0.068*** (0.017)		0.093*** (0.011)	0.169*** (0.015)	
Common Market	0.023 (0.012)	0.030 (0.016)		0.193*** (0.012)	0.067*** (0.015)	
customs union	0.529*** (0.044)	0.604*** (0.046)		0.287*** (0.031)	0.372*** (0.032)	
Preference Trade Area	-0.047*** (0.013)	-0.187*** (0.041)	-0.011 (0.015)	-0.315*** (0.012)	0.111 (0.043)	-0.200*** (0.015)
Product experience	1.971*** (0.004)	1.907*** (0.007)	2.013*** (0.005)	0.720*** (0.009)	0.692*** (0.013)	0.743*** (0.012)
Market experience	0.457*** (0.003)	0.586*** (0.005)	0.407*** (0.004)	0.953*** (0.007)	0.811*** (0.010)	0.061*** (0.009)
Trade openness_exporter	0.036** (0.012)	0.271*** (0.021)	-0.080*** (0.014)	0.129*** (0.010)	0.093*** (0.016)	0.113*** (0.012)
Trade openness_market	0.479*** (0.011)	0.381*** (0.016)	0.506*** (0.016)	0.451*** (0.011)	0.351*** (0.015)	0.424*** (0.018)
Total bilateral trade	0.040*** (0.001)	0.038*** (0.002)	0.043*** (0.002)	0.014*** (0.001)	0.024*** (0.002)	-0.005* (0.002)
lilateral abs.GDP difference	-0.010** (0.004)	0.003 (0.006)	-0.020*** (0.005)	0.046*** (0.004)	0.050*** (0.005)	0.042*** (0.007)
lsum of bilateral GDP	0.169*** (0.022)	0.342*** (0.043)	0.349*** (0.028)	0.851*** (0.024)	0.944*** (0.036)	1.058*** (0.038)
lilateral abs.GDP per capita	0.010** (0.003)	-0.014** (0.004)	0.016*** (0.004)	0.022*** (0.003)	0.018*** (0.003)	0.007 (0.007)
lsum of GDP per capita	0.027 (0.026)	0.039 (0.055)	0.523*** (0.038)	0.798*** (0.030)	0.750*** (0.051)	0.188*** (0.047)
Observations	8227017	2711698	5515319	5914387	2153502	3760885
Level of significance	* p<0.1	** p<0.05	*** p<0.01			

Notes: This table reports results for effects of the export experience (product and market specific export experience) on the likelihood of exporting across a new product, a new market margin. All results report coefficients not marginal effects. A positive coefficient signifies that the change in a covariate enhances a chance of an African exporter exporting at the new-product/market margin. Robust standard errors are in parenthesis, and clustered at dyadprod level. All regressions include exporter-product-market fixed effects (country-pair product fixed effects) and time fixed effects. ***significant at 1%, ** significant at 5%, and * significant at 10%. Coefficients of some other control variables are not reported for brevity purposes

Table 14: Effects of infrastructure related trade frictions and policy shocks

	New-product margin: Product Diversification			New-market Margin: Market Diversification		
	Full sample	Intra Africa	ROW	Full sample	Intra Africa	ROW
Monetary Union	0.011* (0.037)	0.056* (0.064)		0.064* (0.039)	0.139* (0.058)	
Common Market	0.153 (0.090)	0.188 (0.097)		0.317** (0.073)	0.168* (0.081)	
Customs Union	0.319** (0.062)	0.660*** (0.065)		0.229*** (0.060)	0.117** (0.064)	
Preferential Trade Area	-0.012* (0.058)	-0.300** (0.112)	0.166* (0.069)	0.094 (0.048)	-0.151 (0.124)	0.159** (0.055)
Product experience	0.900*** (0.014)	0.874*** (0.026)	0.910*** (0.017)	0.541*** (0.038)	0.604*** (0.063)	0.502*** (0.048)
Market experience	0.552*** (0.008)	0.473*** (0.015)	0.582*** (0.010)	0.507*** (0.021)	0.412*** (0.034)	0.561*** (0.026)
Cost to export	-0.205** (0.041)	-0.187** (0.071)	-0.240* (0.052)	-0.612*** (0.035)	-0.810*** (0.060)	-0.546*** (0.046)
Polity Index	-0.002** (0.002)	-0.004* (0.004)	0.002** (0.003)	-0.007*** (0.002)	-0.002* (0.003)	-0.010*** (0.003)
Financial depth	-0.137** (0.091)	-0.222*** (0.188)	0.104 (0.108)	-0.176* (0.073)	-0.382** (0.143)	0.019 (0.090)
Cost of doing business	-0.008*** (0.022)	-0.018*** (0.043)	0.020*** (0.026)	-0.029** (0.023)	-0.098* (0.048)	-0.044** (0.027)
Time to export	-0.008** (0.052)	-0.097** (0.094)	-0.009** (0.067)	-0.123** (0.046)	-0.104*** (0.085)	-0.175** (0.058)
Exchange rate volatility	-0.310*** (0.032)	-0.301** (0.056)	-0.328** (0.040)	-0.720*** (0.024)	-0.862*** (0.042)	-0.673*** (0.031)
FDI inflow	-0.080 (0.064)	-0.041 (0.125)	-0.040 (0.077)	0.628*** (0.057)	1.159*** (0.111)	0.494*** (0.070)
Observations	568555	160120	408435	310540	101235	209305
P-Values	* p<0.05	** p<0.01	*** p<0.001			

Notes: This table reports results (joint effects) of intra-Africa trade cooperation, export experience and infrastructure related trade frictions. All results report coefficients not marginal effects. A positive coefficient signifies that the change in a covariate enhances a chance of an African exporter exporting at the new-product/market margin. Robust standard errors are in parenthesis, and clustered at dyadprod level. All regressions include exporter-product-market fixed effects (country-pair product fixed effects) and time fixed effects. ***significant at 1%, ** significant at 5%, and * significant at 10%. Coefficients of some other control variables are not reported for brevity purposes

Robustness checks.

Table 15: Determinants of product and market concentration

	Full Sample	Intra Africa	ROW	Full Sample	Intra Africa	ROW
Product concentration index				Market concentration index		
Monetary Union	0.012*** (0.000)	0.008*** (0.000)		0.023*** (0.001)	0.085*** (0.002)	
Common Market	0.002*** (0.000)	0.000 (0.000)		0.050*** (0.001)	0.074*** (0.002)	
Customs Union	0.004*** (0.000)	0.012*** (0.000)		0.476*** (0.004)	0.518*** (0.004)	
Preferential Trade Area	-0.003*** (0.000)	-0.003*** (0.000)	-0.007*** (0.000)	-0.029*** (0.001)	-0.055*** (0.002)	-0.019*** (0.001)
Costs to export	-0.000** (0.000)	-0.010*** (0.000)	-0.005*** (0.000)	-0.023*** (0.001)	-0.022*** (0.002)	-0.019*** (0.001)
Polity index	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.000*** (0.000)
Exchange rate volatility	-0.267*** (0.001)	-0.254*** (0.001)	-0.264*** (0.001)	-0.654*** (0.004)	-0.850*** (0.006)	-0.493*** (0.007)
Financial Depth	-0.052* (0.000)	-0.051** (0.000)	-0.053*** (0.000)	-0.340*** (0.002)	-0.360*** (0.004)	-0.330*** (0.003)
Cost of doing business	-0.007*** (0.000)	-0.009*** (0.000)	-0.007*** (0.000)	-0.170*** (0.001)	-0.161*** (0.002)	-0.170*** (0.001)
Time to export	-0.022*** (0.000)	-0.022*** (0.000)	-0.024*** (0.000)	-0.084*** (0.002)	-0.036*** (0.003)	-0.110*** (0.002)
FDI inflows	0.007*** (0.001)	-0.015*** (0.002)		-0.063*** (0.001)	-0.082*** (0.002)	-0.056*** (0.001)
Product experience	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001* (0.000)	0.001* (0.001)	0.002*** (0.000)
Market experience	0.008*** (0.000)	0.008*** (0.000)	0.008*** (0.000)	0.019*** (0.001)	0.010*** (0.001)	0.027*** (0.001)
_cons	0.558*** (0.005)	0.562*** (0.009)	0.619*** (0.007)	0.466*** (0.049)	0.142*** (0.074)	0.817*** (0.069)
r2	0.653	0.665	0.660	0.832	0.811	0.846
Observations	1605356.000	481036.000	1124320.000	1605356.000	481036.000	1124320.000
P-value	* p<0.05	** p<0.01	*** p<0.001	* p<0.05	** p<0.01	*** p<0.001

Notes: This table reports OLS results in which the dependent variable is the product and market concentration index. I use the same covariates as before in the analysis. Results are robustly replicated. Robust standard errors are in parenthesis, and clustered at dyadprod level. ***significant at 1%, ** significant at 5%, and * significant at 10%. Coefficients of some other control variables are not reported for brevity purposes

Table 16: Determinants of number of products and number of markets

	Intra			Intra		
	Full Sample	Africa	ROW	Full Sample	Africa	ROW
Number of products				Number of markets		
Monetary Union	0.063*** (0.011)	0.134*** (0.021)		0.007*** (0.001)	0.012*** (0.001)	
Common Market	0.376*** (0.011)	0.316*** (0.019)		0.029*** (0.001)	0.036*** (0.001)	
Customs Union	0.823*** (0.022)	1.142*** (0.029)		0.098*** (0.002)	0.105*** (0.002)	
Preferential Trade Area	0.085*** (0.009)	0.177*** (0.017)	0.036*** (0.004)	0.003*** (0.001)	0.009*** (0.001)	-0.001*** (0.000)
Cost to export	-0.319*** (0.012)	-0.186*** (0.015)	-0.441*** (0.021)	-0.039*** (0.001)	-0.036*** (0.002)	-0.041*** (0.002)
Polity index	-0.000* (0.000)	-0.001** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Exchange rate volatility	-0.024*** (0.035)	-0.263*** (0.042)	-0.571*** (0.065)	-0.114*** (0.003)	-0.138*** (0.003)	-0.042*** (0.006)
Financial Depth	-0.380*** (0.019)	-0.546*** (0.032)	0.179 (0.026)	-0.083 (0.001)	-0.106*** (0.002)	-0.068 (0.002)
Cost of doing business	-0.122*** (0.009)	-0.159*** (0.019)	-0.085*** (0.011)	-0.058*** (0.001)	-0.060*** (0.001)	-0.053*** (0.001)
Time to export	-0.431*** (0.015)	-0.617*** (0.025)	-0.179*** (0.021)	-0.006*** (0.001)	-0.019*** (0.002)	-0.034*** (0.002)
Distance to nearest port	-0.006*** (0.011)	-0.191*** (0.013)	0.236*** (0.019)	-0.017*** (0.001)	-0.020*** (0.001)	-0.016*** (0.001)
Product experience	0.030*** (0.002)	0.020*** (0.002)	0.025*** (0.002)	0.001*** (0.000)	0.023 (0.000)	0.001*** (0.000)
Tariff	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)
Market experience	0.177*** (0.007)	0.144*** (0.007)	0.121*** (0.012)	0.001* (0.001)	0.001 (0.001)	0.005*** (0.001)
_cons	0.770*** (0.373)	0.517*** (0.492)	0.570*** (0.600)	0.818*** (0.027)	1.219*** (0.038)	1.026*** (0.053)
r2	0.927	0.939	0.930	0.912	0.912	0.920
Observations	163011	78348	84663	163011	78348	84663
	* p<0.05	** p<0.01	*** p<0.001			

Notes: This table reports OLS results in which the dependent variable is the number of products per exporter and the number of markets per exporter. I use the same covariates as before in the analysis. Results are robustly and qualitatively replicated. Robust standard errors are in parenthesis, and clustered at dyadprod level. ***significant at 1%, ** significant at 5%, and * significant at 10%. Coefficients of some other control variables are not reported for brevity purposes

Table 17: Regional trade groups and their membership

Regional Bloc	Number of Members	No. Of Overlapping members	pairings	Sources
Monetary Unions				
UEMOA	8		56	http://www.uemoa.int
CMA	4		12	http://www.imf.org
CEMAC				
UDEAC	6		30	http://www.cemac.int/
Common Markets				
EAC	5		20	http://www.eac.int
Customs Unions				
COMESA	19		342	http://www.comesa.int/
ECOWAS	15		210	http://www.ecowas.int/
PTAs				
SADC	15		210	http://www.sadc.int
IGAD	6		30	http://igad.int/
ECCAS	10		90	http://www.ceeac-eccas.org
WAMZ	6		30	http://www.wami-imaog.org
AMU	5		20	http://www.maghrebarabe.org
CEN-SAD	23		506	http://www.africa-union.org
IOC	4		12	http://www.ioconline.org
CILSS	13		156	http://www.cilss.bf/
Other sources			npr	http://www.africaecon.org

a. Monetary Union & Pseudo Monetary Union Blocs

Regional Block	Block Membership	Member`s Year of Entry [FTA]	Member`s Year of Entry [Union]	Member`s [Customs [Common Market]	Member`s Year of entry	Member`s Year of entry [Monetary Union]
UEMOA	Benin					1994
	Burkina Faso					1994
	Ivory Coast					1994
	Guinea-Bissau					1997
	Mali					1994
	Niger					1994
	Senegal					1994
	Togo					1994
CMA	Lesotho					1993
	South Africa					1993
	Swaziland					1993
	Namibia					1993
CEMAC (UDEAC)	Cameroon					1999
	Central African Rep.					1999
	Chad					1999
	Congo					1999
	Equatorial Guinea					1999
	Gabon					1999
	Sao Tome & Principe					1999

Notes: **UEMOA**: West African Economic and Monetary Union; **CMA**: The Common Monetary Area; **CEMAC**: Economic and Monetary Community of Central Africa;

b. Common Market Blocs

Regional Block	Block	Member`s Year of Entry [FTA]	Member`s Year of Entry [Union]	[Customs [Common Market]	Member`s Year of entry [Monetary Union]
SACU	Botswana				November 11, 1994
	Lesotho				November 11, 1994
	Namibia				November 11, 1994
	South Africa				November 11, 1994
	Swaziland				November 11, 1994
EAC	Burundi				1st July 2010
	Kenya				1st July 2010
	Rwanda				1st July 2010
	Tanzania				1st July 2010
	Uganda				1st July 2010

c. Customs Union Blocs

Regional Block	Block	Member`s Year of Entry	Member`s Year of Entry	Member`s Year of entry	Member`s Year of entry
Block	Membership	[FTA]	Entry [Customs Union]	[Common Market]	[Monetary Union]
COMESA	Angola				
	Burundi	21. déc.81	31st October, 2000		
	Comoros	21. déc.81	31st October, 2000		
	Dem. Rep. Congo	21. déc.81	31st October, 2000		
	Djibouti	21. déc.81	31st October, 2000		
	Egypt	janv.99	31st October, 2000		
	Eritrea	1994	31st October, 2000		
	Ethiopia	21. déc.81	31st October, 2000		
	Kenya	21. déc.81	31st October, 2000		
	Libya	03. juin.05	31st October, 2000		
	Madagascar	21. déc.81	31st October, 2000		
	Malawi	21. déc.81	31st October, 2000		
	Mauritius	21. déc.81	31st October, 2000		
	Namibia		31st October, 2000		
	Rwanda	21. déc.81	1st January 2004		
	Seychelles	2001	31st October, 2000		
	Sudan	21. déc.81	31st October, 2000		
	Swaziland	21. déc.81	31st October, 2000		
	Tanzania		31st October, 2000		
	Uganda	21. déc.81	31st October, 2000		
	Zambia	21. déc.81	31st October, 2000		
	Zimbabwe	21. déc.81	31st October, 2000		
ECOWAS	Benin	1975	24. juil.93		
	Burkina Faso	1975	24. juil.93		
	Cape Verde	1977	24. juil.93		
	Ivory Coast	1975	24. juil.93		
	Gambia	1975	24. juil.93		
	Ghana	1975	24. juil.93		
	Guinea	1975	24. juil.93		
	Guinea-Bissau	1975	24. juil.93		
	Liberia	1975	24. juil.93		
	Mali	1975	24. juil.93		
	Mauritania	1975	24. juil.93		
	Niger	1975	24. juil.93		
	Nigeria	1975	24. juil.93		
	Senegal	1975	24. juil.93		
	Sierra Leone	1975	24. juil.93		
	Togo	1975	24. juil.93		

COMESA: Common Market for Eastern and Southern Africa; ECOWAS: Economic Community of West African States.

d. Preferential Trade Areas

Regional Block	Block	Member`s Year of Entry	Member`s Year of Entry	Member`s Year of entry	Member`s Year of entry
Block	Membership	[FTA]	Entry [Customs Union]	[Common Market]	[Monetary Union]
SADC	Angola	1992	01. Sept.00		
	Botswana	1992	01. Sept.00		
	Dem. Rep. Congo	1997	01. Sept.00		
	Lesotho	1992	01. Sept.00		
	Malawi	1992	01. Sept.00		
	Mauritius	1995	01. Sept.00		
	Madagascar	2005	01. Sept.00		
	Mozambique	1992	01. Sept.00		
	Namibia	1992	01. Sept.00		
	Seychelles	15. Sept.07	01. Sept.00		
	South Africa	1994	01. Sept.00		
	Swaziland	1992	01. Sept.00		
	Tanzania	1992	01. Sept.00		
	Zambia	1992	01. Sept.00		
Zimbabwe	1992	01. Sept.00			

SADC : The Southern African Development Community

e. Preferential Trade Areas

Regional Block	Block Membership	Member`s Year of Entry [FTA]	Member`s Year of Entry [Union]	Member`s Year of entry [Customs [Common Market]	Member`s Year of entry [Monetary Union]
IGAD	Djibouti	1996			
	Ethiopia	1996			
	Kenya	1996			
	Somalia	1996			
	Sudan	1996			
	Uganda	1996			
WAMZ	Gambia				2015(planned)
	Ghana				
	Guinea				
	Liberia				
	Nigeria				
	Sierra Leone				
ECCAS (CEEAC)	Angola	06.févr.98			
	Burundi	07. févr.98			
	Cameroon	08. févr.98			
	Central African Rep.	09. févr.98			
	Chad	10. févr.98			
	Congo	11. févr.98			
	Dem. Rep. Congo	12. févr.98			
	Equatorial Guinea	13. févr.98			
	Gabon	14.févr.98			
	Rwanda	15.févr.98			
	Sao Tome & Principe	16. févr.98			

Notes : **IGAD** : Inter-Governmental Authority for Development ; **WAMZ**: Western Africa Monetary Zone; **ECCAS**: Economic Community of Western African States;

f. Preferential Trade Areas

Regional Block	Block Membership	Member`s Year of Entry [FTA]	Member`s Year of Entry [Customs Union]	Member`s Year of entry [Common Market]	Member`s Year of entry [Monetary Union]
CEN-SAD	Benin				
	Burkina Faso	4th February 1998			
	Chad				
	Côte d'Ivoire				
	Egypt				
	Ghana				
	Guinea Bissau				
	Mali				
	Niger				
	Sudan				
	Central African Rep.	avr.99			
	Eritrea	avr.99			
	Senegal	févr.00			
	Djibouti	févr.00			
	Gambia	févr.00			
	Liberia				
	Libya				
	Morocco				
	Nigeria				
	Sierra Leone				
Somali					
Togo					
Tunisia					

Notes: **CEN-SAD**: Community of Sahel-Saharan States

g. Preferential Trade Areas

Regional Block	Block	Member`s Year of Entry	Member`s Year of Entry	Member`s Year of entry	Member`s Year of entry
Block	Membership	[FTA]	Entry [Customs Union]	[Common Market]	[Monetary Union]
IOC	Mauritius	1984			
	Seychelles	1984			
	Comoros	1984			
	Madagascar	1984			
CILSS	Benin	April 1994			
	Burkina Faso	April 1995			
	Cape Verde	April 1996			
	Ivory Coast	April 1997			
	Gambia	April 1998			
	Guinea	April 1999			
	Guinea-Basau	April 2000			
	Mali	April 2001			
	Mauritania	April 2002			
	Niger	April 2003			
	Senegal	April 2004			
	Chad	April 2005			
Togo	April 2006				

Notes: **IOC**: Indian Ocean Commission; **CILSS**: Permanent Interstate Committee on Drought Control in the Sahel

Table 18 Variables Description and Data Sources

Variable	Description	Source
Trade Flows	HS 6 digit level for 1995-2009	CEPII-BACI trade dataset (2010)
Tariff data	bilateral trade flows HS 6 digit level	UNCTAD TRAINS
GDP	Real GDP for partner countries	Nominal GDP is obtained from World Bank Development Indicators (2010)
Distance and other trade resistance variables	Standard gravity variables	CEPII
Regional Trade Agreements	13 intra-African regional groupings	http://rtais.wto.org/UI/PublicAllIRTAList.aspx & several official websites
Monetary Union	A binary variable that equals one if the trading partners share a common currency, zero otherwise	author`s construction
Common Market	A binary variable that equals one if the trading partners share a common Market, zero otherwise	author`s construction
Customs Union	A binary variable that equals one if the trading partners share a common customs union, zero otherwise	author`s construction
Preferential Trade Area	A binary variable that equals one if the trading partners share a common preferential trade area	author`s construction
Depth of Integration index	Takes the value of: 4 for MU 3 for CM 2 for CU 1 for PTA	author`s construction
Trade costs	Costs to exports ³⁰ Cost of doing business ³¹ Time to export ³² Customs procedures to export	World Development Indicators (World Bank, 2011)

³⁰ These include distribution costs due to poor road infrastructure (transport costs) poor ware house infrastructure (storage costs and port costs) inter-border costs and the freight costs to destination of the product. The variable is measured in USD per container.

³¹ This variable is the number of days taken to export a container. It is recorded in calendar days

³² This includes cost to register a business normalised as a percentage of gross national income (GNI) per capita