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Expanding Trade within Africa

The Impact of Trade Facilitation

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Abstract

This paper examines the impact of trade facilitation on intra-African trade. The authors examine the role of trade facilitation reforms, such as increased port efficiency, improved customs, and regulatory environments, and upgrading services infrastructure on trade between African countries. They also consider how regional trade

agreements relate to intra-African trade flows. Using trade data from 2003 to 2004, they find that improvement in ports and services infrastructure promise relatively more expansion in intra-African trade than other measures. They also show that, almost all regional trade agreements have a positive effect on trade flows.

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Expanding Trade within Africa:

The Impact of Trade Facilitation¹

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1. Introduction

World trade has expanded faster than economic growth and has been a vehicle for raising the standard of living in OECD countries. African countries have not seen similar trade expansion. Africa's share of world exports has dropped by nearly 60 percent---from 3.5 percent in 1970 to 1.5 percent in 1999, representing a staggering income loss of \$70 billion annually, an amount equivalent to 21 percent of the region's GDP and to more than five times the \$13 billion in annual aid flows to Africa (World Bank, 2003). The dismal performance of African trade can be attributed to several factors traditionally associated with growth, institutions, customs environment and infrastructure.

Rodrik (1998) finds that the trade/GDP ratios of Sub-Saharan African countries are comparable to those of countries of similar size and income, and that Africa's marginalization in world trade is mainly due to low income growth. Fosu (2003) shows that coups d'état have an adverse effect on African export growth that is higher than their effect on GDP. Clarke (2005) finds that African manufacturing enterprises are less likely to export in countries with restrictive trade and customs regulation and poor customs administration. Longo and Sekkat (2004) examine the possibility of expanding intra-African trade with a gravity model, but also pay attention to obstacles to intra-regional trade. They show that insufficient infrastructure, mismanagement of economic policies and internal political tensions are the main obstacles to trade in African countries. Limao and Venables (2001) also show that poor infrastructure accounts for 40 percent of predicted transport costs for coastal countries and up to 60 percent for landlocked countries. In the case of Sub-Saharan Africa (SSA), Limao and Venables conclude that intra-SSA trade costs are substantially higher and trade volumes substantially lower than those for non-SSA countries.

Also, in Africa, relatively high trading costs at the border, low resource complementarities between member countries, small market size, and poor transport infrastructure limit both intra- and inter-regional trade (Yang and Gupta, 2007; Foroutan and Pritchett, 1993; Njinkeu and Powo Fosso, 2006).

While several of the above fall in the overall trade facilitation debate, none of the studies has explicit focus on the competitiveness agenda of African countries as pursued in various trade facilitation options including those considered in the autonomous policy debate or ongoing

multilateral (WTO) or bilateral (the Economic Partnership Agreements (EPA)) trade negotiations. This paper addresses the role of the trade facilitation in promoting intra-African trade. To do this, we extend the gravity model considered in the literature (see Wilson et al 2003a, 2003b, 2004; Clark et al 2004; and OCDE, 2007), with focus on the role of port efficiency, customs environment, regulatory environment, and services infrastructure.

Using a panel data that cover years 2003 and 2004 on a sample of 100 countries which includes 25 African countries, we find that port efficiency and services infrastructure have a positive impact on African trade but that customs and regulatory environments are the factors that lower intra-African trade.

The rest of the paper is organized as follows. Section 2 presents the review of literature. Section 3 describes the data and estimation framework. Section 4 discusses the results while section 5 concludes.

2. Previous studies

Empirical studies on trade facilitation are very recent. Following Fox et al (2003) and OECD (2003), Denis (2006) uses the Global Trade Analysis Project (GTAP) Computable General Equilibrium model to investigate the impact of trade facilitation and regional integration in the Middle East North Africa (MENA) region. He shows that both intra-regional and integration with European Union (EU) have a favourable effect on welfare in the MENA region. With the addition of trade facilitation improvements to trade liberalization, the welfare gains from integrating with the EU increase from US \$ 1.8 billion to US \$ 7.2 billion (0.82 percent increase to base GDP) whereas the welfare gains from intra-regional integration increase from US \$ 913 million to US \$ 3 billion (0.1 percent increase to base GDP).

APEC (1999) uses the same GTAP model and finds that trade liberalization and trade facilitation could increase APEC countries' income by US 75 billion (at 1997 prices, 0.4% of GDP). UNCTAD (2001) finds that a one percent reduction in the cost of maritime and air transport services in developing countries could increase global GDP by US 7 billion (1997 value).

Clark et al. (2004) find that improving port efficiency from the 25th to 75th percentiles reduces shipping costs by more than 12%. Wilson et al. (2003a, 2003b, 2004) show that port efficiency of both the importer and the exporter is positively associated with trade. Moreover,

comparing the effect of port efficiency on imports versus exports, they find that the coefficient is higher for exporter than importer, which implies that global trade flows get a bigger boost when the exporter's port efficiency improve. For landlocked countries, Wilson, Mann and Otsuki (2003a) show that the ports are as important for both import and export as in non-landlocked countries. For island countries, it appears that ports are more important for their import and less important for their export compared to non-island countries. Similar result was found by Limao and Venables (2001).

Wilson et al. (2003a, 2003b, 2004) show that the customs environment has a significantly positive effect on trade of the importing country. Moreover, they argue that trade facilitation is a possible avenue for reducing the cost of imports through customs improvements. OECD (2007) uses a metrics of customs and administrative procedure from the World Bank "Doing Business" survey (2005) to estimate a gravity model. The study concludes that all countries can benefit from more efficient customs and administrative procedures, with the greatest benefits accruing to those reforming countries with the least efficient customs and administrative procedures.

Wilson et al (2003a, 2003b, 2004) find that improving the regulatory environment of the importer and exporter has a positive and significant association with trade. De Groot et al. (2003) also show that a better quality of formal institutions tend to increase trade. Rodrik et al (2002) conclude that the quality of institutions has a significant and positive effect on country's total trade flows. Otsuki et al. (2001) find that African export of cereals, nuts and dried fruits will decline by 4.3 (cereals) and 11 (nuts and dried fruits) percents with a 10 percent tighter European Union standard on aflatoxin contamination levels of these products. Francois and Manchin (2007) also find that exports performance depend on institutional quality.

Wilson et al (2003a, 2003b, 2004) use the percentage of companies that use the internet for e-commerce to assess the effect of internet. They conclude that E-business usage has a positive and significant effect on trade. Freund and Weinhold (2004) show that an increase by 10 percent in the relative number of web hosts could increase by one percent the country's trade flow. Choi (2003) shows that when the number of the internet hosts or users in a host country increased by 10 percent, the foreign direct investment inflows increased by more than 2 percent. Fink et al. (2005) suggest that a 10 percent decrease in the bilateral calling price is

associated with an 8 percent increase in bilateral trade. Francois and Manchin (2007) also find that exports performance depend on communications infrastructure.

In general relatively high trading costs at the border, low resources complementary between member countries, small market size, and poor transport infrastructure limit both intra- and inter-regional African trade (Yang and Gupta, 2007; Foroutan and Pritchett, 1993; Njinkeu and Powo Fosso, 2006).

Studies on trade facilitation in African countries are scarce. Using estimates from a gravity model, Portugal-Perez and Wilson (2008) estimate ad-valorem equivalents of improvements in national trade-cost indicators, measured by the Logistic Performance Indicators and Doing Business, for African countries. They found that the gains for African exporters from improving trade logistics half-way to the level in South Africa are more important than a substantive cut in tariffs. For example, improving trade logistics to lower costs in Ethiopia half-way to the level in South Africa is approximately equivalent to a 7.5 percent cut in tariffs faced by Ethiopian exporters. Njinkeu, Wilson and Powo Fosso (2007) present the trade facilitation agenda for Africa, and discuss alternative methodologies for measuring the impact of trade facilitation on trade.

Longo and Sekkat (2004) suggest that improvements in the transport infrastructure indicators (length road per capita and number of telephone per capita) by 1 percent in one country can boost intra-African trade by about 2 percent. Using a gravity model, Limao and Venables show that poor infrastructure accounts for 40 percent of predicted transport costs for coastal countries and up to 60 percent for landlocked countries. In the case of Sub-Saharan Africa (SSA), Limao and Venables conclude that intra-SSA trade costs are substantially higher and trade volumes substantially lower than those for non-SSA countries. Clarke (2005) shows that African firms engaged in manufacturing are less likely to export in countries with restrictive trade, cumbersome customs regulation, and poor customs administration.

In this paper, we use the gravity model of bilateral trade in the African countries and the Rest of the world, and include a set of trade facilitation indicators (port efficiency, customs and regulatory environment, and services infrastructure) as well as incorporate tariffs and regional trade agreements to see which of these factors might have a greater effect on intra-African trade flows.

3. Methodology

3.1 Rationale for trade facilitation measures

The main impediment to quantitative analysis of trade facilitation is availability of properly defined and measured development of trade facilitation indicators. Wilson, Mann and Otsuki (2003a, 2003b, 2004) present four distinct approaches that meet policymakers' needs. They are: (i) port efficiency, (ii) customs environment, (iii) regulatory environment, and (iv) services sector infrastructure.

Port efficiency (PE) is designed to measure the quality of infrastructure of maritime and air ports. Customs environment (CE) is aimed at measuring direct customs costs as well as administrative transparency of customs and border crossings. Regulatory environment (RE) is designed to measure the economy's approach to regulations. Services infrastructure sector (SI) is designed to measure the extent to which an economy has the necessary domestic infrastructure (e.g., telecommunications, financial intermediaries, and logistic firms) and is using networked information to improve efficiency and to transform activities to enhance economic activity.

These trade facilitation measures have parallel with GATT articles covered in the trade facilitation negotiations of the Doha Development Agenda (DDA), and the bilateral negotiations of Economic Partnership Agreements (EPA) between African regions and the European Union. The negotiation mandate in the DDA for example is provided by Annex D of the July 2004 Framework as follows: "Negotiations shall aim to clarify and improve relevant aspects of Articles V, VIII and X of the GATT 1994 with a view to further expediting the movement, release and clearance of goods, including goods in transit.⁵ Negotiations shall also aim at enhancing technical assistance and support for capacity building in this area. The negotiations shall further aim at provisions for effective cooperation between customs or any other appropriate authorities on trade facilitation and customs compliance issues." WTO (2004)

The port efficiency measure has been constructed in accordance with GATT article V (freedom of transit). This article deals with free movement of goods, which should be allowed

⁵ It is understood that this is without prejudice to the possible format of the final result of the negotiations and would allow consideration of various forms of outcomes.

to move via most convenient route, should be exempt from customs or transit duties, and should be free from unnecessary delays or restrictions.

The definition of custom environment used in this paper addresses the concerns of GATT article VIII. GATT article VIII states that in order to minimize impediments to trade due to customs procedures, fees charged by customs officials must be limited to the approximate cost of customs services. Also, there should not be substantial penalties for minor breaches of customs regulations such as clerical errors. Regulatory environment issues are addressed in GATT article X which discusses Publication and Administration of Trade Regulations. This article comes from the basic transparency obligation that requires prompt publication of laws and regulations affecting imports and exports so that foreign governments and traders may clearly understand them.

3.2 Defining and measuring trade facilitation indicators

Trade facilitation indicators, in this paper, are constructed from the Global Competitiveness Report (GCR) produced by the World Economic Forum (WEF).⁶ The GCR is an annual publication that aims to enhance global understanding of the factors influencing private-sector led economic growth and explains why some countries are much more successful than others at creating new employment opportunities and raising the income level of their respective populations. For participating countries, the GCR reports on performance and policy conditions affecting the ability of private sector firms to be globally competitive -- able to create and add value within the global marketplace. WEF has expanded its worldwide country coverage from 75 countries in 2001, to 125 countries in 2006's GCR. Particular attention has been paid to including more countries from Africa, as well as several from Central Asia, given the increasing importance of this region on the global stage⁷. This database offers then the opportunity for a focus on Africa in a manner that was not possible with previous data sets.

After developing the trade facilitation measures, the next stage in creating the trade facilitation indicators involves collecting the GCR's indexed inputs into the four specific

⁶ Our approach is therefore different from that followed by Wilson, Mann and Otsuki (2004) who used three survey (Kaufmann, Kraay, and Zoido-Lobaton (2002), World Economic Forum Global Competitiveness Report 2001-2002, and IMD Lausanne, World Competitiveness Yearbook 2002).

⁷ For example, the number of African countries has increased from 5 countries (Egypt, Mauritius, Nigeria, South Africa, and Zimbabwe) in 2001 to 25 countries in 2006.

facilitation measures. Each index ranges from 0 to 7 with a low value meaning poor, and a higher value good performance. We use interpolation for the years where no data are available⁸.

Therefore:

■ Port efficiency for each country is the average of two indices namely port infrastructure quality and air transport infrastructure quality. Customs environment is the average of two indices representing irregular payments in imports and exports and the business cost of corruption. The regulatory environment is the average of three indices representing their regular payment in public contracts, favouritism in decisions of government officials, and public trust of politicians. The services sector infrastructure for each country is the average of the quality of competition in internet service providers (ISP) sector and the extent of marketing.

Tables 1 present, for the trade facilitation indicators, the mean, standard deviation, minimum and maximum values for the different samples. As expected, the statistics are very low in Africa compared to other regions. The comparison is interesting if we contrast individual countries or regional integration agreements. Tables 2 and 3 show that for our sample services infrastructure indicators are highly correlated with port efficiency (0.822), customs environment (0.737) and regulatory environment (0.721). Port, customs and regulatory environment are strongly correlated with each other. Port efficiency is highly correlated with gross national income (GNI) per capita. Moreover, GNI is highly correlated with per capita GNI. When we limit ourselves to the African sample, the correlations between trade facilitation indicators are low compared to the correlations in the whole. Two reasons can explain this (Wilson, Mann, and Otsuki, 2004; therefore WMO). First explanation stems from the fact that trade facilitation indicators are different facets of overall trade facilitation and secondly some elements of trade facilitation (administrative transparency, available resources to build quality ports, and so on) are more prevalent in higher income economies than in developing countries.

Port efficiency, customs environment, services infrastructure and regulatory environment may induce reforms that improve with a country's import and export flows and the estimated

⁸ This applies for Cameroon and Senegal where we use the data of the previous year for the year 2004.

coefficients for these variables would be biased particularly due to possible endogeneity associated with high correlations between the trade facilitation and income variables. WMO (2003a, 2003b) however find weak evidence of endogeneity.

Other variables not explicitly associated with trade facilitation are also defined in the database. These include for example the bilateral trade flows in manufactured goods. The trade flow data aggregate the trade flows over the manufactured goods for a given importer-exporter pair. We use import data as it is likely to be more reliable than export data since imports constitute a tax base and governments have an incentive to track import data. We deflate the trade flow with the world import index taken from IFS. We use weighted average of applied tariff rates obtained from UNCTAD TRAINS for the manufactured goods under the above definition where bilateral trade values corresponding to each tariff line are used as the weighted gross national income (GNI) and GNI per capita data. Consumer price index and GDP deflator are taken from the World Development Indicators database. Geographic data and the dummies for same language and colonial links are extracted from the Centre d'Études Prospectives et d'Informations Internationales (CEPII) database⁹. The distance data are calculated following the great circle formula, which uses latitudes and longitudes of the relevant capital cities.

3.3. The empirical model

The gravity model, is a short-hand representation of supply and demand forces in which the amount of trade between countries is assumed to be increasing in their sizes (as measured by their national incomes), and decreasing in the cost of transportation between them (as measured by the distance between their economic centers). By assuming first Cobb-Douglas preferences and then CES preferences, Anderson (1979) was the first to derive the gravity equations from models that assumed product differentiation. In both cases, he made the Armington assumption that products were differentiated by country of origin. Anderson and Wincoop (2003) developed a method that consistently and efficiently estimated a theoretical gravity equation, and correctly calculates the comparative statistics of trade frictions.

Anderson and Wincoop (2004) introduced the border costs as premium on the export prices. In the so called augmented gravity models, most authors (e.g. Carrere, 2004; Musila, 2005;

⁹ <http://cepii.fr/anglaisgraph/bdd/distance.htm>

Frankel and al., 1995; Glick and Rose, 2002; Frankel and Rose, 2002; Rose, 2001; Rose and Engel, 2002; Longo and Sekkat 2004; Wilson et al., 2003a, 2003b, 2004) add other variables such as income per capita, adjacency, common language, common currency, or colonial links. The augmented gravity model of trade has also been used widely as a baseline model for estimating the impact of a variety of policy issues including, regional trading groups (Carrere, 2004; Musila, 2005, Longo and Sekkat 2004), political blocs (Frankel et al, 1995), currency unions (Glick and Rose, 2002; Frankel and Rose, 2002; Rose, 2001; Rose and Engel, 2002; Carrere, 2004), and trade facilitation (Limao and Venable, 2001; Wilson et al, 2003a, 2003b, 2004; Clark et al, 2004). We follow this approach.

In our sample, zero or missing bilateral trade observations reaches 43.53% of the total. Since the dependant variable is truncated at zero, estimation with OLS will produce biased results. We therefore use a Tobit model and our augmented gravity is therefore as follows:

$$\begin{aligned} \ln(1+F_{ij}^t) = & b_0 + b_1 \ln(100 + \text{TARIFF}_{ij}^t) + b_2 \ln PE_i + b_3 CE_i + b_4 \ln RE_i + b_5 \ln SI_i \\ & + b_6 \ln PE_j + b_7 \ln CE_j + b_8 \ln RE_j + b_9 \ln SI_j + b_{10} \ln(GNI_i^t) + b_{11} \ln(GNI_j^t) \\ & + b_{12} \ln(GNIPC_i^t) + b_{13} \ln(GNIPC_j^t) + b_{14} \ln(DIST_{ij}^t) + b_{15} D_{ADJ} + b_{16} D_{AMU} \\ & + b_{17} D_{CEMAC} + b_{18} D_{COMESA} + b_{19} D_{ECOWAS} + b_{20} D_{SADC} + b_{21} D_{UEMOA} + b_{22} D_{NAFTA} + b_{23} D_{ASEAN} \\ & + b_{24} D_{LAIA} + b_{25} D_{AUNZ} + b_{26} D_{MERCOSUR} + b_{27} D_{EU} + b_{28} D_{ENG} + b_{29} D_{CHN} + b_{30} D_{SPN} \\ & + b_{31} D_{FRC} + b_{32} D_{ARB} + b_{33} D_{GMN} + b_{34} D_{POR} + b_{35} D_{RUS} + b_{36} D_{2003} + b_i + \varepsilon_{ji}^t, \end{aligned}$$

where i and j stand for exporter and importer respectively, and t is trading year ($t=2003, 2004$). F_{ij}^t denotes the value of manufacture exports from country j to i at year t . TARIFF_{ij}^t is the applied tariff rate in the percent ad valorem term that is specific to trading partners i and j and year t . The terms PE , CE , RE , and SI denote country's indicators of port efficiency, customs environment, regulatory environment, and service infrastructures. The term GNI denotes the gross national income and $GNIPC$ denotes per capita GNI. Dummy variables are included in the model to capture the effect of preferential trade agreements, language similarity and adjacency. The trade arrangements dummies (see the appendix for the definitions of different trade arrangements) include AMU (D_{AMU}), $CEMAC$ (D_{CEMAC}), $COMESA$ (D_{COMESA}), $ECOWAS$ (D_{ECOWAS}), $SADC$ (D_{SADC}), $UEMOA$ (D_{UEMOA}), $ASEAN$ (D_{ASEAN}), $NAFTA$ (D_{NAFTA}), $LAIA$ (D_{LAIA}), $AUNZ$ (D_{AUNZ}), $MERCOSUR$ ($D_{MERCOSUR}$), and EU (D_{EU}). The language dummies include English (D_{ENG}), French (D_{FRC}), Spanish (D_{SPN}), Chinese (D_{CHN}), Arabic (D_{ARB}), German (D_{GMN}), Portuguese (D_{POR}), and Russian language

(D_{RUS}). The adjacency dummy D_{ADJ} takes the value one if country i is adjacent to country j and zero otherwise. Geographical distance between capital cities i and j is denoted $DiST_{ii}$. b_0 is the intercept, D_{2003} is a dummy for year t ($t = 2003$). This dummy is included in the model to control for time-specific shocks. b_i is a country-specific effect when a country is an exporter. Parameters b 's are the coefficients. $\varepsilon_{ij}(t)$ is the error term that is assumed to be normally distributed with mean zero.

In the literature, it has been found that poorly-performing ports can strongly reduce trade volumes and may have a greater dampening effect on trade for small, less-developed countries than many other trade frictions (Wilson et al, 2003a, 2003b, 2004; Clark et al, 2004). Thus we may expect that improvement of port infrastructure affects positively the trade flows.

Customs is a mandatory element in the movement of goods across borders and the procedures apply to these goods significantly influence the role of national industry in international trade and their contribution to the national economy. Effective and efficient clearance of goods increases the participation of national industry in the world marketplace and contributes to economic competitiveness of nations, encourages investment and development of industry, and increases the small and medium enterprises in international trade (World Customs Organization).

Well developed institutions are likely to decrease the transaction costs for market participants and thus increase the efficiency of markets. They can do this through three channels (World Bank, 2002). (i) They decrease information asymmetries as they channel information about market conditions, participants and goods; (ii) They reduce risk as they define and enforce property rights and contracts, determining who gets what and when, and (iii) They increase competition in markets or decrease it. The improvements of the regulatory environment will affect trade positively.

Services infrastructure sector (SI) is designed to measure the extent to which an economy has the necessary domestic infrastructure (e.g., telecommunications, financial intermediaries, and logistic firms) and is using networked information to improve efficiency and to transform activities to enhance economic activity. For example, the Internet can improve the

productivity in three ways. (i) Internet can lower prices by lowering search costs; (ii) Internet use can cut the cost of holding inventories by allowing large suppliers to bypass retailers and contact customers directly; and (iii) Internet usage can improve the transparency of the host countries and make it comfortable to do business. It is expected that the improvement of SI will have a positive impact on the trade.

Because trade flows are expected to be positively related to national incomes, and negatively related to distance, b_{10} and b_{11} are expected to be positive and b_{14} is expected to be negative. Trade flows are also expected to be positively associated with regional integration, language, and adjacency.

In contrast to cross-section data, panel data permit more general types of heterogeneity. For a single cross-section, these controls can only depend on observed country-pair attributes such as common language, and estimates can thus be biased if there is additionally an observed component to the country-pair propensity to trade. With panel data, such heterogeneity can be controlled through a country-pair fixed effect. In this paper, we use country-specific effect when a country is an exporter. With this specification, distance, adjacency, and language are eliminated because they are fixed over time¹⁰.

We use three sub-samples. The first concerns bilateral trade flows between 100 countries. The second is, a sample comprising 25 African countries (see table 8 in appendix). The last one concerns intra-African trade and trade with the rest of the world¹¹. The coefficients of the three sub-samples are assumed stable over the period 2003-2004.

¹⁰ See Cheng and Wall (2005) for the various specifications to controlling for heterogeneity in the gravity models of trade.

¹¹ Due to endogeneity problem and space, we don't present the results of the estimations with GNI per capita as regressor. However, the results with all the variables, including GNI per capita, are available on request to the authors

4. The results

(i) Whole sample

In this section, we extended the Wilson, Mann and Otsuki (WMO) (2003a, 2003b, 2004)¹² sample to include 25 countries primarily from Africa. We have also captured the effect of African regional integration schemes. The gravity model was run using an ordinary least squares (OLS) with the Huber/White robust standard error.

The coefficients of ports efficiency of both the importer and the exporter are positively associated with trade. Comparing the effect of port efficiency on import vs. exports, we find, as did WMO, that the coefficient is higher for exporter than importer (see table 4). Customs environment of the importer is significant and positively related to trade in pooled cross-section and year 2003 fixed effect regressions, while the customs coefficient of the exporter is not significant. This implies that global trade flows get a bigger boost when the importer's customs environment improves. The regulatory environment of the exporter is significant and negatively associated to trade in all regressions. The regulatory environment of the importer is insignificant. The services infrastructure coefficient of the importer is significant and positively associated with trade in all regressions, while services infrastructure of the exporter is not significant.

African regional agreements, namely, CEMAC, COMESA, SADC, and UEMOA, have a positive and significant effect on trade. When we use the year 2003 and exporter fixed effects, coefficients of regional trade agreements become significant and positively related to trade. We applied the Tobit model (table 5) on the whole sample countries to take into account missing or zero trade. We also added a dummy to isolate the effect of intra-African trade. The results (see third column of table 5) show that when African countries trade among them, the world trade increases significantly.

In the pooled cross-section regression, tariff is negative and significant. In the fixed effects regressions, it becomes insignificant but remains negative. For the trade facilitation indicators, port efficiency of exporter is positive and significant whereas port efficiency of importer

¹² The results obtained with WMO's sample are very similar with the previous one. These results are available on request to the authors.

country is negative and not significant in pooled cross-section regression and year 2003 fixed effects. This means that importer country must improve their port infrastructure to be competitive in the global market. The customs environment variable of both the importer and the exporter is positively associated with trade in the fixed effect regressions. Comparing the effect of customs environment on import vs. exports, we note that the coefficient is higher for the importer than the exporter. The regulatory environment of the importer has significant and positive effect on trade whereas regulatory environment of the exporter has significant and negative effect. The services infrastructure variable of importer is significant and positive in all the regression whereas it is negative and significant for exporter country in the fixed effect regressions.

When using pooled cross-section regression, CEMAC, COMESA, ECOWAS and SADC regional integration affects trade positively. The other African regional agreements (AMU, UEMOA) have not effect on trade. In the year fixed effect regression, all the African regional agreements are significant and positively associated with trade.

(ii) Intra-African Trade

We use only the sample of 25 African countries as reporter (exporter) and partner (importer). Using a Tobit model, table 6 shows that port efficiency of both the importer and the exporter is positively associated with trade in the pooled cross-section regression. Comparing the effect of port efficiency on import vs. exports, we note that the coefficient is higher for importer than exporter. Because the dependant variable is the value of manufacture exports, this result can be explained by the fact that African countries are net importer of manufactured goods. The customs environment of the importer has a significant and negative effect on trade. The policy implication of this result is that African countries must improve their customs environment to boost their economy. The regulatory environment of the importer has significant and positive effect on trade whereas the regulatory environment of the exporter has significant and negative effect. Only services infrastructure of the importer is positively associated with trade. The services infrastructure of the exporter is insignificant.

A comparison of the results of the fixed effects and pooled cross-section shows that allowing for year 2003 fixed effect and exporter heterogeneity (see second and third column of table 6) lowers the absolute value of the trade facilitation indicators, and increase the estimated income elasticity of trade.

The CEMAC, ECOWAS and UEMOA agreements are not significant and negatively related to trade in the pooled cross-section regression whereas AMU is significant and negatively related to trade. COMESA and SADC are significant and positively associated with trade. When we use the fixed effect regressions, all the African regional agreements become significant and positively related to trade.

Tariff is positive and significantly associated with trade. This means that for African countries, tariff is not a constraint for trade contrary to non tariff barriers that appear to be the main challenge for African countries.

(iii) Intra-African Trade with the Rest of the World

We use a sample of African countries as reporter (exporter) and partner (importer) and other countries as partner (importer) only. Using a Tobit model, table 7 shows that tariff is still significant and positively related to trade. Port efficiency of both the importer and the exporter is positively associated with trade. Comparing the effect of port efficiency on import vs. exports, we note that the coefficient is higher for importer than exporter. In contrast to the previous case, customs environment of the exporter is now positive (negative) and significant in pooled cross-section (fixed effect regression). The policy implication of this result is that African countries must improve their customs environment to boost their economy. Regulatory variable of both the importer and the exporter is positively associated with trade in exporter fixed effect regression. Comparing the effect of regulatory environment on import vs. exports, we note that the coefficient is higher for exporter than importer. A comparison of the results of the fixed effects and pooled cross-section shows that allowing for year 2003 fixed effect and exporter heterogeneity (see second and third column of table 7) lowers the absolute value of port efficiency, customs environment and services infrastructure coefficients, and increases the absolute value of regulatory environment coefficient. We also observe an increase of the estimated income elasticity of trade. For regional agreements, we have the same results as described in the previous section.

5. Conclusion

The aim of this paper was to examine the impact of trade facilitation on intra-African trade. Port efficiency, customs environment, regulatory environment and services infrastructure are the measures of trade facilitation used. The results show that besides the traditional determinants of bilateral trade, port efficiency and services infrastructures are the factors that have a positive effect on African trade. On the other hand, customs and regulatory environments are the main obstacles to intra-African trade. Overall a coherent and comprehensive trade facilitation agenda should be an essential element of domestic reform. Negotiations at the WTO and Economic Partnership Agreements (EPA), especially because they explicitly recognize the need for technical assistance and capacity building, offer an opportunity. The further consensus about the relevance of trade facilitation to the aid for trade initiative confirms the centrality of the above conclusion for African countries (see Mugadza, 2008).

First, the customs environment is a key factor for accelerating trade among countries. Improvement of African countries' customs can generate positive spill-overs. Second, a good regulatory environment attracts foreign investment and facilitates the trade.

In our sample, 43.53% of importer-exporter pairings had zero bilateral trade. Thus apart from analyzing the effects of different variables on trade, we must also focus on factors that may explain why trade does not occur at all among countries. Employing a selection model allowed us to take account of this censoring process (Francois and Manchin, 2007).

Appendix: Data sources and definitions

The yearly data are constructed for 100 countries and 11 regional trade agreements spanning from 2003 to 2004. These data are computed from the Global Competitiveness Report (GCR) released by The World Economic Forum, the World Development Indicators (WDI) published by the World Bank, the International Financial Statistics (IFS) released by the International Monetary Funds, as well as the Commodity Trade (COMTRADE), and the Trade Analysis and Information System (TRAINS) published by the United Nations Conference on Trade and Development (UNCTAD). The individual countries and regional trade agreements are presented in table 8.

A.1 Real GNI

For all countries, we deflate Gross National Income (GNI) (source: WDI) by the all-item consumer price index (CPI) for the baseyear 2000 (source: WDI) except for Serbia and Zimbabwe. For these two countries, we use GDP deflator (source: WDI) for the baseyear 2000.

A.2 Real GNI per capita

For all countries, we deflate GNI per capita (source: WDI) with the CPI except for Serbia and Zimbabwe. For these countries, we use GDP deflator (source: WDI).

A.3 Trade facilitation Indicators

A.3.1 Port efficiency

The Port efficiency for each country is the average of two indexed inputs from GCR:

- Port Infrastructure Quality (Port facilities and inland waterways in your country are: 1 = underdeveloped; 7 = as developed as the world's best)
- Air Transport Infrastructure Quality (Air Transport in your country is: 1 = infrequent and inefficient; 7 = as extensive and efficient as the world's best)

A.3.2 Customs environment

The customs environment for each country is the average of two indexed inputs from GCR:

- Irregular Payments in Imports and Exports (How common do firms in your industry give irregular extra payments or bribes connected with import and export permits: 1 = common; 7 = never)
- Business Cost of Corruption (Do unfair or corrupt activities of other firms impose costs on your firm? 1 = impose large costs; 7 = impose no costs/not relevant)

A.3.3 Regulatory environment

The Regulatory environment for each country is constructed as the average of three indexed input from GCR:

- Irregular Payment in Public Contracts (How commonly do firms in your industry give irregular extra payments or bribes connected with public contracts/investment projects: 1 = common; 7 = never)
- Favoritism in Decisions of Government Officials (When deciding upon policies and contracts, government officials: 1 = usually favor well-connected firms and individuals; 7 = are neutral among firms and individuals)

■ Public Trust of Politicians (Public trust in the honesty of the politicians is: 1 = very low; 7 = very high)

A.3.4 Services sector infrastructure

Services sector infrastructure for each country is the average of two indexed inputs from GCR:

■ Quality of competition in Internet service providers (ISP) sector (Is competition among your country's ISP sufficient to ensure high quality, infrequent interruptions and low prices? 1 = no; 7 = yes, equal to world's best)

■ Extend of marketing (the extend of marketing in your country is: 1 = limited or primitive; 7 = high and among the world's best sophisticated)

A.4 Trade Flows

The bilateral trade flows are bilateral trade in manufactured goods (source: COMTRADE), defined as commodities in categories 5 to 8 in SITC 1 digit industry except those in category 68 (non-ferrous metals). The Trade flow data aggregate the trade flows over the manufactured goods for a given importer-exporter. We deflate the trade flow using the world import index (source: IFS).

A.5 Tariffs

We use weighted average of applied tariff rates (source: TRAINS) for the manufactured goods under the above definition where bilateral trade values corresponding to each tariff line are used as the weight.

A.6 Adjacency, language, colony, and distance

Geographic data, together language and colonial links are extracted from the Centre d'Études Prospectives et d'Informations Internationales (CEPII) database (see www.cepii.fr). Distance data are calculated following the great circle formula, which uses latitudes and longitudes of the relevant capital cities.

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Table 1: Trade Facilitation summary statistics

Variables	Mean	Std. Deviation	Min	Max
Whole sample				
Port	4.548	1.195	2.350	6.850
Customs	4.757	1.115	2.500	6.800
Regulatory	3.541	1.151	1.700	6.067
Services	4.568	0.881	2.900	6.500
African sample				
Port	3.414	0.992	1.450	5.450
Customs	3.853	0.695	2.200	5.350
Regulatory	3.003	0.671	1.867	4.633
Services	3.482	0.714	1.550	4.950

Source: Authors' computations based on World Economic Forum *Global Competitiveness Report*.

Table 2: Trade Facilitation Indicators for Africa in 2003

Countries	Port Efficiency		Customs Environment		Regulatory Environment			Services Infrastructure	
	Ports	Air Transport	Irregular Payment	Costs of Corruption	Bribes	Favoritism	Public Trust	Internet	Marketing
Algeria	3.00	3.00	4.50	3.70	3.50	3.80	2.30	2.70	2.50
Angola	2.00	2.70	3.40	2.80	2.80	2.10	1.50	2.70	2.20
Botswana	3.00	4.30	5.10	4.50	4.50	4.40	4.70	2.90	4.00
Cameroon	2.60	2.90	3.30	3.10	2.70	3.20	2.30	3.80	3.60
Chad	1.30	1.70	2.30	2.10	2.20	1.90	1.50	1.60	1.50
Egypt	3.90	4.00	4.40	4.00	4.50	3.80	2.90	4.70	3.80
Ethiopia	1.40	5.00	4.30	3.10	3.40	3.00	2.20	1.40	2.10
Gambia	4.10	4.90	4.60	3.80	3.80	4.10	3.30	4.30	2.70
Ghana	3.20	3.50	3.90	3.60	3.50	3.20	2.80	3.80	3.70
Kenya	2.90	4.70	3.40	2.50	2.40	2.60	2.00	3.70	4.10
Madagascar	2.10	2.90	3.50	2.40	2.50	2.60	1.70	3.60	3.30
Malawi	1.80	3.50	5.30	3.70	3.60	3.00	2.00	4.10	3.20
Mali	1.20	2.80	3.40	2.80	2.70	3.10	2.00	3.40	2.20
Mauritius	5.20	5.40	3.70	3.20	3.20	3.50	1.80	1.90	4.60
Morocco	3.70	4.30	3.60	3.20	3.00	3.20	3.10	3.70	4.40
Mozambique	2.20	3.20	3.30	2.90	2.90	2.40	1.80	3.10	2.40
Namibia	4.90	4.80	4.40	3.50	3.60	3.20	3.10	4.00	3.90
Nigeria	2.50	3.50	2.80	2.80	2.20	2.10	1.50	3.60	3.90
Senegal	3.50	4.30	3.80	3.00	2.80	3.20	2.00	3.30	3.20
South Africa	4.60	6.00	4.60	4.70	3.80	3.40	3.10	4.20	5.20
Tanzania	3.20	3.40	4.20	3.00	3.60	3.40	3.20	4.10	3.30
Tunisia	4.50	4.90	5.30	4.50	4.60	4.70	4.60	4.00	4.20
Uganda	2.10	3.20	3.20	3.00	2.60	2.60	2.00	4.10	2.80
Zambia	1.70	3.50	4.00	3.10	3.20	3.10	1.70	3.60	3.30
Zimbabwe	1.80	3.10	3.50	3.40	2.60	2.00	1.20	3.20	3.70
AMU	3.73	4.07	4.47	3.80	3.70	3.90	3.33	3.47	3.70
CEMAC	1.95	2.30	2.80	2.60	2.45	2.55	1.90	2.70	2.55
COMESA	2.49	3.80	3.87	3.12	3.08	2.83	1.92	3.30	3.31
ECOWAS	2.90	3.80	3.70	3.20	3.00	3.14	2.32	3.68	3.14
SADC	2.95	3.89	4.09	3.38	3.30	3.01	2.35	3.40	3.55
UEMOA	2.35	3.55	3.60	2.90	2.75	3.15	2.00	3.35	2.70
AFRICA	2.90	3.82	3.91	3.30	3.21	3.10	2.42	3.42	3.35
ASEAN	4.43	5.10	4.28	4.12	3.97	3.67	3.53	4.35	4.38
AUNZ	5.95	6.25	6.55	6.20	6.25	5.20	4.80	5.30	5.65
EU	5.27	5.71	5.95	5.27	5.21	4.27	3.93	4.98	5.55
LAIA	3.04	3.83	4.56	3.25	3.45	2.61	1.77	4.20	4.04
MERCOSUR	3.33	3.68	4.48	3.50	3.55	2.65	1.88	4.33	4.10
NAFTA	5.07	5.70	5.43	4.67	4.77	3.70	3.43	5.33	5.63

Source: Authors' computations based on World Economic Forum *Global Competitiveness Report*.

Table 3: Simple Correlations

Correlations: Whole Sample

	Trade	Tariff	PE	CE	RE	SI	GNI	GNIPC	Distance
Trade	1								
Tariff	0.021	1							
PE	0.409	-0.085	1						
CE	0.337	-0.056	0.758	1					
RE	0.319	-0.077	0.774	0.880	1				
SI	0.462	-0.028	0.808	0.727	0.676	1			
GNI	0.613	0.068	0.552	0.419	0.400	0.655	1		
GNIPC	0.447	-0.09	0.764	0.766	0.684	0.745	0.654	1	
Distance	-0.33	0.026	0.003	-0.034	-0.036	0.011	0.033	-0.071	1

Correlations: Intra-Africa and Rest of the World Sample

	Trade	Tariff	PE	CE	RE	SI	GNI	GNIPC	Distance
Trade	1								
Tariff	0.116	1							
PE	0.338	0.106	1						
CE	0.249	0.118	0.500	1					
RE	0.238	0.244	0.594	0.813	1				
SI	0.285	0.106	0.513	0.410	0.445	1			
GNI	0.331	0.199	0.455	0.119	0.376	0.365	1		
GNIPC	0.2693	0.155	0.683	0.226	0.501	0.358	0.781	1	
Distance	-0.209	-0.11	0.072	-0.022	-0.066	0.054	-0.038	0.012	1

Correlations: Intra-Africa Sample

	Trade	Tariff	PE	CE	RE	SI	GNI	GNIPC	Distance
Trade	1								
Tariff	0.162	1							
PE	0.331	0.071	1						
CE	0.221	0.061	0.459	1					
RE	0.197	0.172	0.572	0.794	1				
SI	0.290	0.052	0.510	0.421	0.457	1			
GNI	0.298	0.159	0.456	0.036	0.352	0.380	1		
GNIPC	0.224	0.113	0.675	0.159	0.479	0.339	0.796	1	
Distance	-0.36	0.014	0.240	0.041	0.127	0.110	0.193	0.202	1

Note: All variables are in logs.

Source: Authors' computations based on World Economic Forum *Global Competitiveness Report* for trade facilitation indicators, COMTRADE for trade flows, UNCTAD TRAINS for tariffs, and World Bank *World Development Indicators* for GNI.

Table 4: Whole sample: OLS

	Pooled Cross-Section		Year 2003 Fixed Effect		Exporter Fixed Effect	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Constant	-16.687***	1.853	-24.333***	2.127	-25.703***	2.101
Tariff	-1.431***	0.391	-1.886***	0.446	-1.740***	0.443
Ports Exporter	1.081***	0.136	1.089***	0.156	1.160***	0.155
Ports Importer	0.767***	0.150	0.725***	0.167	0.513***	0.167
Custom Exporter	0.403**	0.206	0.918***	0.256	0.358	0.231
Custom Importer	0.173	0.224	-0.067	0.254	-0.146	0.245
Regulatory Exporter	-0.841***	0.155	-1.009***	0.183	-0.736***	0.173
Regulatory Importer	0.154	0.158	0.476**	0.177	0.569***	0.175
Services Exporter	0.205	0.175	-0.043	0.199	0.062	0.198
Services Importer	1.064***	0.215	0.844***	0.228	1.062***	0.226
GNI Exporter	0.694***	0.014	0.666***	0.015	0.666***	0.015
GNI Importer	1.144***	0.021	1.101***	0.021	1.124***	0.020
Distance	-1.327***	0.024	-	-	-	-
AMU	0.332	0.474	3.190***	0.254	3.177***	0.207
CEMAC	3.614**	1.331	6.376***	1.153	6.723***	1.283
COMESA	0.995***	0.313	1.967***	0.359	1.934***	0.352
ECOWAS	0.201	0.548	2.454***	0.698	2.515***	0.702
SADC	1.956***	0.294	3.675***	0.321	3.517***	0.316
UEMOA	3.614**	1.266	4.141**	1.404	3.875**	1.331
ASEAN	2.175***	0.172	4.333***	0.155	4.141***	0.153
NAFTA	-0.261	0.505	2.163***	0.374	2.032***	0.388
LAIA	0.970***	0.118	2.740***	0.124	2.833***	0.129
AUNZ	1.610***	0.262	3.528***	0.124	3.416***	0.251
MERCOSUR	0.322	0.250	0.911**	0.307	0.986***	0.301
EU	-0.039	0.064	2.369***	0.062	2.351***	0.063
English	0.679***	0.080	-	-	-	-
French	-0.068	0.156	-	-	-	-
Spanish	0.848***	0.102	-	-	-	-
Arab	0.173	0.366	-	-	-	-
Chinese	2.731***	0.207	-	-	-	-
German	-0.536**	0.203	-	-	-	-
Portuguese	1.443***	0.283	-	-	-	-
Russian	2.006***	0.204	-	-	-	-
Adjacency	0.720***	0.115	-	-	-	-
Observations	19800		19800		19800	
R ²	0.693		0.601		0.605	

Note: All non-dummy variables are in logs. The notations “*”, “***”, and “****” denote significance at 10, 5 and 1 percent levels, respectively.

Source: Authors’ computations based on World Economic Forum *Global Competitiveness Report* for trade facilitation indicators, COMTRADE for trade flows, UNCTAD TRAINS for tariffs, and World Bank *World Development Indicators* for GNI.

Table 5: Whole Sample: Tobit Model

	Pooled Cross-Section		Year 2003 and Exporter Fixed Effects		Intra Africa Trade Dummy and 2003 Fixed Effect	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Constant	-54.465***	4.770	-80.233***	4.983	-80.914***	4.994
Tariff	-2.168**	1.021	-1.248	1.069	-1.432	1.072
Ports Exporter	3.367***	0.372	3.154***	0.388	3.152***	
Ports Importer	-0.413	0.361	-0.551	0.373	-0.687*	0.374
Custom Exporter	-1.115**	0.551	2.489***	0.626	3.237***	0.634
Custom Importer	1.905***	0.536	3.690***	0.587	4.375***	
Regulatory Exporter	-1.022**	0.419	-2.793***	0.450	-3.399***	0.457
Regulatory Importer	1.973***	0.394	1.300***	0.416	0.779*	0.421
Services Exporter	-0.226	0.453	-1.175**	0.475	-0.812*	0.477
Services Importer	5.591***	0.448	4.819***	0.466	5.195***	0.468
GNI Exporter	1.323***	0.033	1.321***	0.034	1.310***	0.034
GNI Importer	1.947***	0.035	1.908***	0.036	1.907***	0.036
Distance	-2.227***	0.079	-	-	-	-
AMU	-0.625	2.268	8.241***	2.068	-	-
CEMAC	9.660*	4.857	16.313***	5.054	-	-
COMESA	3.411***	0.587	4.959***	0.607	-	-
ECOWAS	1.969*	1.197	5.991***	1.247	-	-
SADC	4.363***	0.551	7.391***	0.562	-	-
UEMOA	3.316	3.713	5.543	3.841	-	-
ASEAN	-2.368**	1.120	1.518	1.158	1.808	1.164
NAFTA	-3.757*	1.985	-0.506	2.067	-0.604	2.076
LAIA	2.335***	0.568	7.310***	0.528	7.203***	0.530
AUNZ	0.497	4.824	3.325	5.049	3.314	5.072
MERCOSUR	1.160	0.999	2.227**	1.026	3.216***	1.026
EU	-0.748**	0.306	3.288***	0.283	3.248***	0.285
English	0.854***	0.191	-	-	-	-
French	1.692***	0.494	-	-	-	-
Spanish	4.397***	0.346	-	-	-	-
Arab	3.739**	1.257	-	-	-	-
Chinese	1.795	1.366	-	-	-	-
German	-2.612	1.630	-	-	-	-
Portuguese	5.865***	0.809	-	-	-	-
Russian	5.592***	1.267	-	-	-	-
Adjacency	0.446	0.355	-	-	-	-
Intra Africa trade dummy	-	-	-	-	3.770***	0.257
Observations	19800		19800		19800	
Log-likelihood	-46159.607		-46871.893		-46940.51	

Note: All non-dummy variables are in logs. The notations “*”, “**”, and “***” denote significance at 10, 5 and 1 percent levels, respectively.

Source: Authors’ computations based on World Economic Forum *Global Competitiveness Report* for trade facilitation indicators, COMTRADE for trade flows, UNCTAD TRAINS for tariffs, and World Bank *World Development Indicators* for GNI.

Table 6: Intra Africa: Tobit Model

	Pooled Cross-Section		Year 2003 Fixed Effect		Exporter Fixed Effect	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Constant	-66.081***	20.523	-115.210***	20.988	-98.439***	21.256
Tariff	10.362**	4.052	12.268**	4.312	8.256*	4.457
Ports Exporter	4.542***	1.458	1.216	1.516	1.386	1.487
Ports Importer	7.194***	1.547	6.352***	1.515	5.815***	1.503
Custom Exporter	3.153	2.941	3.146	3.439	2.365	3.114
Custom Importer	-6.430**	3.02	-6.367*	3.537	-7.136**	3.212
Regulatory Exporter	-10.885***	2.656	-9.506***	2.887	-9.139***	2.801
Regulatory Importer	5.461**	2.702	4.738	2.957	6.768**	2.904
Services Exporter	0.711	1.454	1.368	1.550	1.512	1.541
Services Importer	17.971***	1.818	17.899***	1.870	15.121***	1.990
GNI Exporter	0.850***	0.177	1.058***	0.187	1.044***	0.185
GNI Importer	0.398**	0.174	0.588***	0.181	0.738***	0.186
Distance	-4.163***	0.642	-	-	-	-
AMU	-5.577*	3.258	9.901***	2.696	10.009***	2.679
CEMAC	-2.470	4.999	8.970*	5.231	9.764*	5.135
COMESA	2.628***	0.844	4.186***	0.866	4.368***	0.860
ECOWAS	-1.691	1.700	3.292**	1.618	3.482**	1.607
SADC	1.519*	0.873	5.603***	0.805	5.412***	0.801
UEMOA	-0.122	4.700	7.318	4.821	6.714	4.793
English	-1.211*	0.667	-	-	-	-
French	5.342***	1.109	-	-	-	-
Arab	4.853**	2.318	-	-	-	-
Portuguese	5.301***	1.700	-	-	-	-
Adjacency	2.223*	1.167	-	-	-	-
Observations	1200		1200		1200	
Log-likelihood	-2776.061		-2768.998		-2770.627	

Note: All non-dummy variables are in logs. The notations “*”, “**”, and “***” denote significance at 10, 5 and 1 percent levels, respectively.

Source: Authors’ computations based on World Economic Forum *Global Competitiveness Report* for trade facilitation indicators, COMTRADE for trade flows, UNCTAD TRAINS for tariffs, and World Bank *World Development Indicators* for GNI.

Table 7: Intra Africa and Rest of world (only as partner): Tobit Model

	Pooled Cross-Section		Year 2003 Fixed Effect		Exporter Fixed Effect	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Constant	-119.909***	10.678	-162.977***	10.540	-149.413***	10.695
Tariff	11.058***	2.160	14.477***	2.234	11.486***	2.303
Ports Exporter	2.461**	0.937	1.255	0.970	1.436	0.965
Ports Importer	8.615***	0.747	8.453***	0.754	8.107***	0.750
Custom Exporter	5.164***	1.379	-5.863***	1.535	-7.039***	1.428
Custom Importer	1.415	1.511	2.091	1.725	0.631	1.572
Regulatory Exporter	4.118***	1.049	6.485***	1.115	7.033***	1.078
Regulatory Importer	0.309	1.350	0.863	1.441	2.871**	1.420
Services Exporter	-0.9078	1.125	-1.494	1.182	-1.252	1.175
Services Importer	14.055***	0.855	13.514***	0.879	11.262***	0.945
GNI Exporter	1.984***	0.089	1.900***	0.091	1.896***	0.091
GNI Importer	0.828***	0.085	0.973	0.088	1.087***	0.091
Distance	-2.978***	0.265	-	-	-	-
AMU	-5.527**	2.928	8.173***	2.539	8.214***	2.529
CEMAC	3.172	4.826	15.193***	4.966	15.568***	4.900
COMESA	6.296***	0.763	8.921***	0.774	9.075***	0.773
ECOWAS	3.373**	1.525	8.249***	1.547	8.310***	1.539
SADC	5.219***	0.753	9.490***	0.716	9.310***	0.715
UEMOA	-0.114	4.601	7.075	4.680	6.551	4.663
English	1.239***	0.381	-	-	-	-
French	5.001***	0.745	-	-	-	-
Arab	4.528**	1.805	-	-	-	-
Portuguese	6.060***	1.055	-	-	-	-
Colony dummy	1.075	1.146	-	-	-	-
Adjacency	2.731**	0.968	-	-	-	-
Observations	4950		4950		4950	
Log-likelihood	-10283.827		-10436.04		-10424.171	

Note: All non-dummy variables are in logs. The notations “*”, “***”, and “****” denote significance at 10, 5 and 1 percent levels, respectively.

Source: Authors’ computations based on World Economic Forum *Global Competitiveness Report* for trade facilitation indicators, COMTRADE for trade flows, UNCTAD TRAINS for tariffs, and World Bank *World Development Indicators* for GNI.

Table 8: Sample and Definition of the Regional Trade Agreements

Regional Trade Blocs	Countries Members	Main dates*
CEMAC (Economic and Monetary Community of Central Africa)	Cameroon, Chad	1962, creation of the UDE (Equatorial Customs Union); 1964, revision and creation of the UDEAC (Central African Customs and Economic Union); 1973, revision of the UDEAC; end of the 1980s, failure of the compensation funds; 1994, revision and creation of the CEMAC
ECOWAS (Economic Community of West African States)	Gambia, Ghana, Mali, Senegal, Nigeria	1975, creation of the ECOWAS; 1990, start of a more general scheme of intra-regional liberalization
COMESA (Common Market for Eastern and Southern Africa)	Angola, Egypt, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Uganda, Zambia, Zimbabwe	1981, creation of the PTA (Eastern and Southern African Preferential Trade Area); end of 1980s, first reduction in the customs tariffs on intra-regional trade; 1993, revision and creation of the COMESA
SADC (Southern African Development Community)	Angola, Botswana, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia, Zimbabwe	1980, creation of the SADCC (Southern African Development Coordination Conference); 1992, revision and creation of the SADC
AMU (Arab Maghreb Union)	Algeria, Morocco, Tunisia	1989, creation
UEMOA (West African Economic and Monetary Union)	Mali, Senegal	1994, creation
NAFTA (North American Free Trade Agreement)	Canada, Mexico, United States of America	1992, creation
LAIA (Latin American Integration Association)	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela	1980, creation
MERCOSUR (Southern Common Market)	Argentina, Brazil, Paraguay, Uruguay	1991, creation
AUNZ	Australia, New-Zealand	
ASEAN (Association of Southeast Asian Nations)	Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam	1967, creation
EU (European Union)	Austria, Belgium, Czech Republic (since 2004), Denmark, Estonia (since 2004), Germany, Greece, Hungary (since 2004), Italia, Ireland, Finland, France, Latvia (since 2004), Lithuania (since 2004), Luxembourg, Netherlands, Poland (since 2004), Portugal, Slovak Republic (since 2004), Slovenia (since 2004), Spain, Sweden, United Kingdom	1951, creation of the European Coal and Steel Community; 1957, establishment of the European Community; 1994, revision and creation of the European Union
Other countries	Bangladesh, Bulgaria, China, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Hong Kong, Iceland, India, Israel, Jamaica, Japan, Jordan, Korea, Macedonia, Malta, Nicaragua, Norway, Pakistan, Panama, Romania, Russian Federation, Serbia, Sri Lanka, Switzerland, Taiwan, Trinidad and Tobago, Turkey, Ukraine	

*The dates for CEMAC, ECOWAS, COMESA and SADC are drawn from Carrere (2004).