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TRADE FACILITATION AND MANUFACTURED EXPORTS: IS AFRICA DIFFERENT?¹

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Abstract

Trade facilitation, defined as reducing the transaction costs associated with the enforcement, regulation and administration of trade policies, has been at the forefront of discussions on policy measures for reducing the costs of exporting and importing in developing countries. This study uses a new panel dataset for 124 developed and developing countries, available for the period 2003-04, to assess the impact of trade facilitation and other trade-related institutional constraints on manufacturing export performance with particular reference to Africa. We estimate a standard gravity model augmented with trade facilitation, regulatory quality and infrastructure indicators. Our results show that trade facilitation reforms could contribute to improved export performance in Africa, but other reforms, including the quality of the regulatory environment and the quality of the basic transport and communications infrastructure are also needed. Furthermore, improvements in on-the-border and behind-the-border policies yield a higher return in terms of increasing manufacturing export performance in African countries than in the rest of the world.

Keywords:

Trade facilitation, export performance, gravity model, Africa, regulatory (institutional) quality

I. Background

‘...the last three decades have seen stagnation in Africa. The composition of Africa’s exports has essentially remained unchanged, and has contributed to a collapse in Africa’s share of world trade, from around six per cent in 1980 to two per cent in 2002.....Africa’s collapse in share of world trade has been partly due to its low capacity to produce and trade – in commodities, manufactured goods and services – and to do this competitively. In other words there are key problems in what economists would call the ‘supply side’, rather than the ‘demand side’ issues of market access.’ (Commission for Africa, 2005:256).

Despite its improved economic performance in recent years, sub Saharan Africa’s trade performance continues to disappoint.⁴ Trade has grown at about three fourths of the world rate and the rate of diversification has been well below that achieved by other developing countries. Primary commodities and fuels account for the largest share of exports, with the share of manufactured goods remaining at about 30 per cent (Gupta and Yang, 2006). This is despite the adoption of significant liberalisation of trade since the 1980s in the majority of African countries, which has resulted in a halving of scheduled import tariff rates, from 33 per cent in the early 1980s to 15 per cent in 2002 (Morrissey, 2005; Clarke, 2005).

The marginalisation of Africa in world trade, and particularly in manufactured exports, has generated a range of explanations. For some observers, limited market access and declining terms of trade for SSA exports, particularly agricultural goods, continues to act as a constraint on the growth of Africa’s exports (Morrissey and Mold, 2006). Others emphasise the role of ‘geography and endowment’ as limiting Africa’s capacity for increasing manufactured exports (Wood and Berge, 1997; Elbadawi et al 2006). A third explanation blames poor design and implementation of trade liberalisation policies for the disappointing trade performance (World Bank, 2006). Fourthly, for some observers, the decline in SSA’s share of world trade is a manifestation of the lack of economic growth over the last thirty years. Reversing the orthodox causal link from trade liberalisation to economic growth, this approach makes growth the principal driver of trade performance. The ‘growth diagnostics’ literature, for example, emphasises the need to focus on policy reforms that are essential for growth, as distinct from

⁴ Henceforth, we will refer to sub-Saharan Africa as Africa.

reforms such as trade liberalisation that concentrate on potential efficiency gains (Hausmann, Pritchett and Rodrik, 2005; Hausmann, Rodrik and Velasco, 2006).⁵

Fifth, an enabling environment has been identified as a key condition for market-led economic growth (World Bank, 2004). On a comparative basis, SSA has been shown to lag behind other regions in providing an investment and business environment that is conducive to private sector development (Eifert, Gelb and Ramachandran, 2005). In the context of trade performance, it is argued that Africa can be characterised as a high cost and high risk environment, that constrains private sector investment and tradable production (Collier and Gunning, 1997). This constraint is particularly severe on manufacturing, and has held responsible for reducing Africa's international competitiveness and acting as a brake on diversification into manufactured exports (Elbadawi, Mengistae and Zeufack, 2006).

Trade facilitation reform has been at the forefront of discussions on policy measures for reducing the costs of exporting and importing in developing countries, as the international business community has increasingly expressed its concerns for greater transparency, efficiency and procedural uniformity of cross-border transportation of goods. Trade facilitation was added to the WTO agenda at the Singapore Ministerial Meeting in 1996 and the Ministerial Declaration called on the Council for Trade in Goods to conduct research into cross-border barriers and analyse the effects of these barriers on traders and consumers. Within the WTO Doha Round negotiations, trade facilitation is one of the main 'implementation related issues and concerns' (Finger and Wilson, 2006). While developing countries have been unwilling to commit to negotiations on a multilateral agreement on trade facilitation involving legal obligations and disputes rules, there is general agreement on the importance of trade facilitation reform. The 2005 WTO Ministerial Meeting Declaration recognised the importance of technical assistance and capacity building to enable developing country members to benefit more fully from multilateral trade liberalisation, and stated that 'aid for trade should aim to help developing countries, particularly LDCs, to build the supply side capacity and trade related infrastructure that they need to assist them to implement and benefit from WTO agreements and move broadly to expand their trade' (WTO, 2005: para. 57). Much of the current discussion on the design of a 'aid for trade' programme is focused on funding for trade facilitation measures.

⁵ 'Presented with a laundry list of needed reforms, policymakers have either tried to fix all of the problems at once or started with reforms that were not crucial to their country's growth potential.... By focusing on the one area that represents the biggest hurdle to growth, countries will be more likely to achieve success from their reform efforts' (Hausmann, Rodrik and Velasco, 2006:12)

In a narrow sense, trade facilitation involves reducing the transaction costs associated with the enforcement, regulation and administration of trade policies, and reforms in this area are designed to reduce the costs involved in the cross border movement of goods and services (Staples, 2002; OECD, 2005). Within this understanding of trade facilitation, reform measures are limited to the logistics of moving goods through ports or more efficiently moving documentation associated with cross border trade. A broader definition of trade facilitation includes the business environment in which trade transactions take place, and which affects the transaction costs associated with international trade.

Despite the high expectations of gains from trade facilitation, empirical estimates of the impact of reforms on trade performance have been limited and it has proved difficult to provide strong supporting evidence of a causal link between trade facilitation reforms and trade performance.⁶ Consequently, much of the evidence in support of trade facilitation is focused on the improvements in procedures rather than the outcomes in terms of trade performance. The aim of this paper is to address this lacuna in the existing literature by providing an empirical analysis of the trade facilitation argument. Specifically, the paper reports the econometric results of testing for the impact of trade facilitation constraints on export performance in SSA countries. From a policy perspective, the findings of the study are intended to contribute to a diagnostic assessment of the constraints on trade growth, thereby improve understanding of the potential contribution of trade facilitation reforms, relative to other determinants of trade growth, to improving export performance.

The paper is structured as follows: Section II provides a review of the recent literature relating to trade facilitation and other determinants of export performance, provides an overview of Africa's trade facilitation environment, and reviews studies that analyze the impact of 'on-the-border' and 'behind-the-border' constraints on Africa's exports in particular. Section III describes the methodology and data used in the study. Section IV presents the results. Finally, Section V concludes.

⁶ Walsh (2006) notes that 'although it is hard to quantify with any accuracy the potential benefits of modernizing customs administration, there is ample evidence of the improvements that can be made in raising revenue and improving service to the trade community. These gains can be considerable'

II. Literature overview

The internationalisation of production and growth in world trade have contributed to a heightened concern with the effect of on-the-border and inside-the-border trade transaction costs on international trade. As the pace of global integration continues, developing countries' ability to link with global and regional markets is increasingly affected by the costs that the private sector incurs in trade transactions. Country characteristics such as a cumbersome customs and port clearance procedures, deficiencies in trade related infrastructure or burdensome regulatory requirements represent a negative externality on private transactions that can increase significantly trade transaction costs and distort industrial organization with adverse effects on trade and economic growth.

It has been argued that transaction costs are a major factor in explaining the pattern of international trade and investment flows (Deardorff, 2001; Obsfeld and Rogoff, 2000), and estimates of the share of directly incurred trade transaction costs range from 2 to 15 percent of total trade (OECD, 2005). Wilson et. al. (2004) estimate the impact of trade facilitation on trade flows within a gravity model methodology and show large potential increases in trade and growth rates from trade facilitation reform in countries that have above average trade transaction costs. Djankov et. al. (2006) find that, on average, each additional day that a product is delayed prior to being shipped reduces trade by at least 1 percent. Nordas et. al. (2006) analyse the relation between time for exports and imports, logistics services and international trade and find that time delays result in lower trade volumes and reduce the probability that firms will enter export markets for time sensitive products. Several studies have estimated the effects of trade facilitation reform within a general equilibrium (CGE) modelling framework by assuming a given percentage reduction in trade transaction costs and estimating the effect on economic welfare (Francois et al 2005; Walkenhorst and Yasui, 2005; Hertel and Keeney, 2006).⁷ The results of the CGE modelling studies show that the welfare gains from trade facilitation are large, relative to the gains from trade and services liberalisation.

While the existing literature indicates that developing countries can expect to benefit from reforms that would lower trade transaction costs, the empirical results may overstate the

⁷ In some cases, trade facilitation is modeled indirectly by an increase in the assumed trade elasticities.

magnitude of the potential gains.. In particular, most studies do not allow for the costs of implementing the trade facilitation reforms.⁸

Despite the apparent benefits of trade facilitation reform, the implementation of these measures on their own may have a limited effect on export performance in the absence of complementary reforms designed to relax supply side constraints (Hellquist, 2003). It is widely recognised that institutions play an important role in determining the outcome of policy reform measures (Rodrik, 2006). Building on the work of North (1990), there is a growing literature that investigates the impact of institutional factors on international trade flows. Anderson and Marcouiller (2002) show that strong institutions, and in particular, legal systems capable of enforcing commercial contracts and impartial formulations and implementations of government economic policy, contribute to the growth in trade. Ranjay and Lee (2004) also examine contract enforcement regulation and report similar results. Jensen and Nordas (2004) provide evidence that institutional quality is positively related to the overall level of openness while de Groot et. al. (2004) show that similarity between trading partners in the quality of their institutions promotes trade. Freund and Bolaky (2004) identify regulations that govern labour market flexibility, business entry and bankruptcy and show, within a growth regression model, that trade enhances growth rates in economies with good regulatory quality. Chang et. al. (2005) run growth regressions on panel data for a large sample of countries and find that a broad mix policies and institutions play an important role in determining the outcome of trade liberalization.

The quality of domestic infrastructure has also been shown to have a significant impact on trade transaction costs. Limão and Venables (2001) find that internal infrastructure costs account for 40 per cent of total trade transportation costs for coastal countries and as much as 60 per cent of transport costs for landlocked countries. Nordas and Piermartini (2004) find that domestic infrastructure has a significant impact on bilateral flows and that this impact is particularly important for time-sensitive sectors such as clothing and automobiles.

The recent World Bank report '*Doing Business in 2006*' documents the wide diversity among countries in their trade facilitation and business legislation environment. In Africa, on average, it took 35.6 days and 8.1 documents to export a standard container of goods, whereas in OECD countries an identical good would only take 10.5 days and 4.5 documents (Table 1, columns 2-3).

⁸ An exception is Duval (2006) who undertakes a survey of the financial costs of implementing twelve specific trade facilitation measures and calculates that the long term savings exceed the implementation costs.

Similarly, in terms of business legislation, in Africa, it took 10.8 procedures and 61.8 days to start a business, as opposed to 6 procedures and 16.6 days in OECD countries (Table 1, columns 4-5). For all these indicators Africa's performance is the worst of all continents, with the single exception of number of days to start a new business in Latin America. Furthermore, infrastructure availability in Africa is below average even in comparison with other low-income developing regions. Columns 6 and 7 in Table 1 shows that the percentage of paved roads, telephone subscribers per 1,000 of population is the lowest in Africa indicating that significant constraints on manufacturing exports arise not only due to inferior trade facilitation and regulatory environment but also as a result of poor quality of transportation and communication infrastructure.

Table 1: Business environment in comparative perspective

Region	Trade Facilitation		Starting a Business		Infrastructure	
	Time for Exports	Documents to Export	Duration (days)	Procedures (number)	Paved Roads	Telephone
East Asia *	23.9	6.9	46.3	8.7	32.3	187.9
Europe & Cen. Asia*	29.2	7.0	32	8.8	82.9	241.7
L. America & Caribb.*	22.2	7.0	73.3	9.8	26.8	179.5
MENA*	27.1	7.1	40.9	9.7	66.3	90.7
South Asia*	34.4	8.0	32.5	7.6	30.8	35.1
OECD	10.5	4.5	16.6	6.0	90	550.9
Sub-Saharan Africa	35.6	8.1	61.8	10.8	12.5	10.3

Source: World Development Indicators (September 2006, Edition); * - excludes high income economies;

Table 2 shows that the percentage share of manufacturing export in total exports in Africa is less than half of world average. Throughout the last decade this ratio in Africa remained at around 30% indicating little diversification into manufactures of Africa's exports. Only one region, Middle East and North Africa, has this ratio lower than the African continent.

Table 2: Manufacturing exports as % of total exports

Region	1996	1998	1999	2000	2001	2002	2003
World	75.0	77.1	77.0	76.1	76.3	77.4	77.3
East Asia & Pacific*	76.9	77.7	80.2	80.2	80.2	81.4	80.2
Europe & Central Asia*	54.9	58.5	57.0	56.4	57.0	58.3	57.1
Latin America & Caribbean*	53.3	59.2	58.2	57.7	58.3	58.1	56.1
Middle East & North Africa*	N/A	20.3	20.2	19.3	19.7	20.3	20.4

South Asia*	75.8	78.6	79.5	79.2	78.1	78.3	79.1
Sub-Saharan Africa	28.6	29.4	29.7	31.2	33.5	35.4	31.4
High income	79.0	81.3	80.9	79.9	80.1	81.2	81.4
OECD	79.4	80.4	81.7	82.0	81.0	81.2	81.4

Source: World Development Indicators (September 2006, Edition); * excludes high income economies.

There is a growing body of evidence that Africa's manufacturing export performance has been affected adversely by unduly high trade transaction costs due in part to excessive policy distortions. Clarke (2005) has studied factors that affect the export performance of manufacturing enterprises in African countries using a cross country manufacturing survey and finds that manufacturing enterprises are less likely to export in countries with poor customs administrations and restrictive trade and customs regulations. Eifert et al (2005) compare firm level data on total factor productivity for almost 3,000 African firms over the period 2000-2004 and show that a weak business environment is reflected in disproportionately high indirect costs which lower the return to labour in production and thereby reduces labour demand and real wages. Elbadawi et al (2006) find that after allowing for the effect of geography in terms of physical distance from foreign markets, weak institutions adversely affect Africa's manufactured exports performance. Yoshino (2006) in a study of African exporters finds that behind-the-border factors, including electricity services and internet services, not only affect how much manufacturing firms can export but also the geographical orientation in exports.

The literature strongly suggests therefore, that differences in behind-the-border regulatory and infrastructure quality as well as in on-the-border trade facilitation procedures can be expected to result in significant cross country differences in trade transaction costs. In the next section we estimate the impact of these constraints on Africa's export performance.

III. Methodology and Data

Despite early criticism of Tinbergen's (1962) original application of the gravity model in terms of its lack of theoretical underpinning, recent developments in trade theory have strengthened the theoretical basis for the gravity model, confirming its usefulness in empirical testing of bilateral trade flows (Baldwin and Taglioni, 2006). Standard gravity models assume that the volume of trade between two countries is positively related to the size of these economies as measured by GDP and negatively related to the trade costs between them. A number of variables are normally used to capture trade costs. These include whether a country is landlocked or an island economy, the distance between the exporter and importer, as well as various 'dummy' variables that

indicate whether the country pair belongs to a regional trade agreement, or shares a common language, border or colonial heritage with its trade partner.

In this study the ‘standard’ gravity model is augmented with policy variables that impact directly on the on-the-border and behind-the-border trade costs. The basic structure of the augmented model is as follows:

$$\ln EXP_{ij}^t = \beta_0 + \ln \beta_1 GDP_i^t + \ln \beta_2 GDP_j^t + \ln \beta_3 POP_i^t + \ln \beta_4 POP_j^t + \ln \beta_5 D_{ij} + \ln \beta_6 REMOTE_i + \ln \beta_7 TARIFF_{ji}^t + \beta_8 dRTA_{ij} + \beta_9 BORDER_{ij} + \beta_{10} dLANG_{ij} + \beta_{11} dCOLONY_{ij} + \beta_{12} dISLAND_{ij} + \beta_{13} dLANDL_{ij} + \ln \beta_{14} REG_i^t + \ln \beta_{15} TF_i^t + \ln \beta_{16} INFRA_j^t + \alpha_{ij}^t + e_{ij}^t \quad (1)$$

where i denotes the exporter, j denotes the importer, t denotes a year ($t=2003, 2004$) and the variables are defined as follows:

- EXP_{ij} denotes exports in manufactured products from i to j at time t ,
- GDP_i and GDP_j is the real GDP of exporting and importing country, respectively,
- POP_i and POP_j is population of exporting and importing country, respectively,
- D is the distance between i and j ,
- $REMOTE$ is the remoteness variable measured as the weighted average distance to all other countries, weighted by GDP
- $TARIFF$ is a simple average tariff applied by country j on all exporting countries products,
- $LANG$ is a binary “dummy” variable which is unity if i and j have a common language and zero otherwise,
- $COLONY$ is a binary variable which is unity if i and j were ever colonies after 1945 with the same colonizer,
- $BORDER$ is a binary ‘dummy’ variable which is unity if i and j share a common border,
- $ISLAND$ is a variable which is 1 if one of the trade partner is an island economy and 2 if both partners are island economies and 0 otherwise,
- $LANDL$ is a variable which is 1 if one of the trade partner is landlocked and 2 if both partners are landlocked and 0 otherwise,
- RTA is a binary variable that is unity if i and j both belong to the same regional trade agreement,
- TF is exporting country’s i or importing country’s j trade facilitation variable,
- REG is exporting country’s quality of regulation variable,

- INFRA is exporting country's i infrastructure variable,
- $\alpha_i(j)t$ is a set of importer and time "fixed effects",
- e_{ij}^t is the error term that is assumed to be normally distributed with mean zero.

We estimate the model with 2 year data running from 2003 to 2004 for 124 countries out of which 25 are in sub-Saharan Africa.⁹ We include time specific (yearly) and partner (importer) dummies in most regressions.

Recent literature illustrates that a sample selection bias can arise if the gravity model is estimated as in (1). Helpman et. al. (2006) show that almost half of all countries do not trade with each other and that the rapid growth of trade in the period 1970-2000 was predominantly due to growth in the volume of trade among countries that already traded with each other, rather than due to the expansion of trade among new trade partners. With the standard logged specification (1) the gravity model does not allow for trade values to take the value of zero.¹⁰ To deal with this problem of sample selection bias we follow Helpman et. al. (2006) who propose the use of the Heckman two-step procedure (Heckman, 1979). This procedure entails first estimating a probit model that determines the probability that a country pair engages in trade. Next, a gravity regression is computed that determines the level of trade with a selectivity variable obtained from the probit regression. In order to implement the Heckman procedure and thus to correct for the sample selection bias we need an identification variable(s) i.e. a variable that influences the probability of engaging in trade but does not affect its volume. Helpman et. al. (2006) show empirically that a common religion variable, defined as the probability that two randomly drawn persons, one from each country sharing the same religion, satisfies this condition. In our estimates we confirm the result of Helpman et. al. (2006) and use the common religion variable for the identification procedure¹¹.

⁹ Due to data availability, however, we are unable to use panel techniques. Panel data estimates are much less sensitive to omitted variable bias because they do not assume that one year of data is representative of the long-run equilibrium (Blonigen, 2005 cited in Leshner, M. and Miroudot, 2006).

¹⁰ Two common approaches to handle the presence of zero trade include simply discarding the zeros from the sample or adding a constant factor to each observation on the dependent variable. This strategy is correct as long as the zeros are randomly distributed. However, if the zeros are not random, as is usually the case, then this induces a selection bias. Even though the proportion of observations with zero trade may vary somewhat depending on, among other things, the size of the sample, it is usually quite significant suggesting that the proper handling of these zeros is potentially very important. In our sample, for example, over 15% of the trade volumes are zeros.

¹¹ The common religion variable was calculated with data from Robert J. Barro dataset on Religion Adherence available at <http://www.economics.harvard.edu/faculty/barro/data.html> available. We would like to express our gratitude to Robert J. Barro for kindly sharing his data sets.

We also employ an alternative methodological approach to verify the robustness of our obtained trade facilitation, regulatory quality and infrastructure elasticities. We regress the indices against per-capita income and population and take the residuals as representative of deviations from income conditional expected values for these respective indexes¹².

$$\ln \text{INDEX}_{i,t} = \alpha_0 + \alpha_1 \ln \text{pcGDP}_{i,t} + \alpha_2 \ln \text{POP}_{i,t} + e_{i,t} \quad (2)$$

We use the deviations $e_{i,t}$ as our proxies for the on-the-border and behind-the-border indices and show the results of this gravity model exercise in Table 2 Column 3. This methodology is important for two reasons. Firstly, it ensures that we are no longer comparing countries at different levels of development. We are thus correcting for the fact that the regulatory or trade facilitation environment could have divergent effects depending on the level of per capita income. Secondly, it reduces problems of multicollinearity arising because proxies for institutional, trade facilitation and infrastructural quality are correlated among themselves and with per capita income.¹³

Our methodological approach imposes the assumption that the error terms are normally distributed, however this assumption is often violated in large datasets where the error term is heteroskedastic. We thus use robust standard errors without specifying a cluster group in all the regression.

Our dataset contains around 18, 000 observations of bilateral trade in the manufacturing sector for the period 2003-2004¹⁴. These data for 124 countries are obtained from UN Comtrade database. We follow the literature and define the manufacturing sector as commodities in categories 5 to 8 in SITC rev. 2 except those in category 68 (non-ferrous metals). The standard variables used in gravity model analysis are included in our model. Recent studies (Jensen and Nordas, 2004) emphasize trade policy as an important omitted variable in the standard gravity equations; we thus include a measure of simple average tariffs, obtained from TRAINS database¹⁵. Anderson and van Wincoop (2003) show that bilateral trade is determined by relative rather than absolute trade costs and to control for this factor we include a remoteness term in the model defined as the

¹² The results of these regressions are presented in Appendix Table A1

¹³ Appendix Table A2 gives the correlation matrix of dependent and independent variables.

¹⁴ We are constrained to a 2 year period because data for institutional variables are only available from 2000 for most of the countries in our sample. A list of the 124 countries in our dataset is given in Appendix Table A3

¹⁵ For bilateral import protection, we use applied tariffs, $\ln T_{ij,t} = \ln (1 + t_{i,j,t})$. $t_{i,j,t}$ indicates the applied tariff rate offered by importer i to all exporters in period t .

weighted average distance to all other countries, weighted by GDP. As a proxy for market size we include real GDP at constant 2000 prices and population for both the exporting and importing country obtained from the World Development Indicators. Other variables that are intended to capture variation in trade costs between country pairs such as distance, regional trade agreement membership, adjacency or whether countries share a common language or colonial past, are taken from Rose (2004) database¹⁶.

The main focus of the paper is on the effect of on-the-border and behind-the-border trade costs on export performance with particular reference to African economies. We use data from a variety of sources to construct institutional indicators for trade facilitation, infrastructure and regulatory quality for all countries in our sample.

We define trade facilitation as an aggregate index of trade facilitation based on time and costs of custom procedures from the *Doing Business* database. The index consists of the following components:

- number of all documents required to export/import goods
- time necessary to comply with all procedures required to export/import goods
- cost associated with all the procedures required to export/import goods

Our main regulatory quality variables were constructed using information relating to the cost effectiveness of regulation from the World Bank's *Doing Business* initiative. This dataset contains information on time and money spent on bureaucratic procedures and thus gives a more precise and consistent account of regulatory efficiency relative to perception based indicators. Using the *Doing Business* dataset we construct two indices, a contract enforcement index and a business regulation index.¹⁷

The contract enforcement regulation index consists of the following subcomponents:

- number of procedures in a court case involving bridging a contract;
- time in calendar days to resolve the dispute;
- cost in court fees and attorney fees, where the use of attorneys is mandatory or common, expressed as a percentage of the debt value.

¹⁶ Here we would like to express our gratitude to Andrew Rose for kindly sharing his data sets which are available on his website at <http://faculty.haas.berkeley.edu/arose/RecRes.htm>

¹⁷ The literature review, in the previous section, indicated that legislation in these two regulatory subcomponents might be particularly important for export performance.

The business regulatory index measures restrictions in factor movement, across and within industries, and consists of three subcomponents:

- Labour legislation index – is an average of three indices covering flexibility of hiring, conditions of employment and flexibility of firing constructed by Botero et. al. (2003) from detailed analysis of labour markets around the world.
- Index of business entry – comprises of a number of all procedures required to register a firm, average time spent during each procedure, official cost of each procedure.
- Bankruptcy regulations – consist of cost of the bankruptcy proceedings, average time to complete a procedure and a recovery rate, which calculates how many cents on the dollar claimants (creditors, tax authorities, and employees) recover from an insolvent firm.

Finally, we construct a domestic infrastructure indicator, which consists of data on the share of paved roads, road and rail density, per 1000 population and the number of telephone and mobile phone subscribers, per 1000 population. The data are obtained from the World Development Indicators and International Telecommunication Union.

The original data used to construct the trade facilitation, regulatory quality and infrastructure variables described above were derived from a variety of sources and are measured in different metrics, including, survey results indices, percentages, and number of users. In order to ensure compatibility between the various variables used, all indicators were indexed and rescaled to vary from 0 to 1 so that higher quality of regulation, trade facilitation and infrastructure correspond to higher values of the index.

IV. Results

The results of applying the model described in section III are presented in Tables 3 and 4. Table 3 reports the results from regressions using the *Doing Business* indices for regulatory quality and for trade facilitation. Our approach is to regress trade facilitation, regulatory quality and infrastructure on bilateral trade volumes while controlling for the standard gravity model controls such as country size and geographical indicators¹⁸.

¹⁸ Our regulatory variables dataset are highly correlated, with an average coefficient of correlation of about 0.85. They are therefore entered separately in the regressions.

Table 3 shows second-stage Heckman procedure results that give the unbiased estimates for the model with a selectivity term included that controls for sample selectivity bias.¹⁹ The regression in column 1 includes only ‘standard’ gravity model variables that control for external trade costs and dummies for African economies and natural resource exporters.²⁰ Trade cost variables related to geography and culture are shown to be important for export performance. Both distance from a trade partner and remoteness from the rest of the world exert a negative, statistically significant effect on bilateral trade flows. Indeed, the magnitude of the coefficient on distance is the highest of all variables confirming the continued importance of transport costs in determining trade patterns. Also, common language and colonial heritage continue to play a significant part in determining bilateral trade patterns. Being a landlocked economy has a statistically significant, negative effect on export performance. Trade policy variables also exert an impact on trade volumes: the coefficient on importing country’s tariffs is negative and significant for export performance although the magnitude of it is small (around -0.01). This suggests that tariffs still suppress trade but as manufacturing tariffs come down this effect diminishes. Our results also suggest that, *ceteris paribus*, countries that are members of Regional Trade Agreements trade more among themselves. Crucially, for this study, the coefficient on the ‘Africa dummy’ is negative and statistically significant indicating that Africa’s manufacturing export performance cannot be explained solely by external trade costs such as distance, remoteness or tariffs. Finally, the dummy on natural resource exporters is also significant and negative which shows that, *ceteris paribus*, large natural resource exporters have lower manufacturing exports.

Columns 2 and 3 show the gravity model regression results with indices intended to capture internal (on and behind-the-border) trade costs as proxied by trade facilitation environment, business regulation quality and infrastructure availability variables. As expected, each of these variables is significant at 1% level and has a positive impact on export performance. However, the size of the coefficients for the trade facilitation, regulation and infrastructure variables display considerable variation. Our results show that regulatory quality, proxied by the contract enforcement and business regulation quality indices, is a robust (highly significant) institutional determinant of export performance. The impact of the infrastructure index, which measures both

¹⁹ Results of the whole Heckman procedure are presented in Appendix Table A4. Column 1 and 3 show that our identification variable (the probability that two randomly drawn people from a country pair share the same religion) is insignificant in GLS estimates of trade volumes but seems to be important in determining whether a country pair engage in trade (Column 2 and 4). Econometrically, this provides the needed exclusion restriction for identification of the second stage trade flows equation. The common religion variable is, used therefore, as an exclusion variable in the construction of the inverse of mills ratio for the second stage Heckman procedure (Tables 1 and 2).

²⁰ Natural resource exporters countries are defined as point source exporter (of energy exports only) following Isham et. al. (2002).

transport and communication infrastructure quality, is also large. Improvements in border procedures and customs environment, as measured in the trade facilitation index, also impact on export performance but the effect is significantly smaller than that of the other two institutional variables. Quantitatively, our results imply that, *ceteris paribus*, a 10 per cent improvement in the regulatory environment will result in a 5 per cent increase in manufactures export performance. An identical rise in the infrastructure index would increase bilateral exports by a little over 6 percent, and a similar trade facilitation improvement would yield a rise in exports of less than 3 percent.

When internal (on- and behind-the-border) trade cost variables are included in the model, the ‘Africa dummy’ becomes insignificant. This indicates that once we control for internal factors such as infrastructure availability and regulatory (institutional) quality, Africa’s trade in manufacturing products is in line with that predicted by the model. In fact the ‘Africa dummy’, in regressions 2 and 3, becomes positive and borders statistical significance (at 10% level) indicating that, if anything, Africa’s manufacturing exports are higher than would be predicted, given the quality of the business environment and infrastructure prevailing in the continent.

We have also tested for reverse causation, where improvements in export performance could influence regulatory quality or trade facilitation efforts by using the number of documents required to exports and settlers mortality data as instruments for trade facilitation and regulatory quality, respectively.²¹ The intuition is that the number of documents required for exports is a measure of excessive bureaucracy that slows down trade facilitation, but is not a result of shipping volumes. Colonial period settlers mortality is a standard instrumental variable that proxies institutional (regulatory) environment. Here, the assumption is that depending on mortality rates European settler established either extractive colonies with little incentives for institutions building or created permanent settlements with an institutional environment that imitated that found in the old world. Thus, colonial era settler’s mortality will be correlated with the institutional and regulatory environment in a colony but is unlikely to be the outcome of increasing growth rates and export levels. Our results (column 4) confirm that both instruments for internal trade costs are important for export performance indicating that endogeneity was not a significant problem in our sample²².

²¹ We follow Djankov et. al (2006) and Acemoglu et. al. (2001) in the choice of these instruments.

²² Settlers mortality variable is only available in countries that were colonized which significantly decreases our country sample.

Table 3: 2nd stage Heckman procedure regression results for the gravity model*.

GLS: 2 nd Step Heckman				
Explanatory Variable	(1)	(2)	(3)	(4)
GDP	1.274*** (.010)	1.289*** (.011)	1.278*** (.011)	1.278*** (.011)
GDP partner	.357*** (.020)	-.034 (.040)	.048 (.040)	.049 (.045)
Population	.543*** (.015)	.491*** (.019)	.485*** (.017)	.517*** (.016)
Population Partner	.044 (.032)	.039* (.020)	.065*** (.022)	.0502** (.0201)
Distance	-1.56*** (.020)	-1.49*** (.021)	-1.483*** (.021)	-1.28*** (.011)
Remoteness	-.009*** (.002)	-.017*** (.002)	-.004*** (.002)	-.013*** (-.013)
Tariffs	-.0135*** (0.07)	-.025*** (0.05)	-.0158*** (0.03)	-.027*** (0.12)
Border	.888*** (.096)	1.04*** (.105)	1.053*** (.106)	.954*** (.105)
Colony	.469*** (.099)	.353*** (.102)	.335*** (.102)	
Language	.830*** (.042)	.932 (.045)	.978*** (.044)	.908 (.044)
Island	.158*** (.036)	.074* (.040)	.118*** (.040)	.118 (.105)
Landlocked	-.129*** (.032)	-.273*** (.036)	-.253*** (.036)	-.153 (.136)
RTA	.168*** (.014)	.196*** (.014)	.196*** (.014)	.106*** .014
Dummy Africa	-.159** (.063)	.100 (.067)	.107 (.069)	
Dummy Resource Exp.	-.932*** (.054)	-.718*** (.062)	-.766*** (.062)	
Trade Facilitation		.221*** (.003)	.225*** (.004)	
Business Regulation		.522*** (.081)		
Contract Enforcement			.573*** (.085)	
Infrastructure		.656*** (.047)	.715*** (.047)	
Documents for exports				.146*** (.038)
Settlers Mortality				.093*** (.022)
Selectivity Term (Inverse Mills Ratio)	-1.05*** (.072)	-1.12*** (0.473)	-.975*** (0.402)	
No. of Ob	18702	18702	18702	7825
R ² / Pseudo R ²	0.7153	0.7539	0.7645	0.6739
Prob > F	0.00	0.00	0.00	0.00

*- For all tables * indicates significance at 10%, ** at 5% and *** at 1% level, respectively. Robust standard errors in parenthesis.

In the previous sections we have argued that Africa’s trade facilitation and regulatory environment is exerting a significant constraint on manufacturing exports in the region. To investigate this claim further and in order to get insights into other factors contributing to Africa’s low propensity to export, we include in the gravity model interaction variables between the main variables in the model and the ‘African’ dummy’, as presented in column 1 of Table 4. The interaction variables provide an estimation of the additional effect of the key regressors for Africa. For example, the negative and significant sign of the interaction variable between distance and the Africa dummy suggests that distance is a more negative factor for trade in Africa than for the rest of the world.²³ The effect on trade for the typical country is a reduction of 17%; while for the African countries the resulting reduction is 23% of trade on average²⁴. Crucially to this study, the interaction variables are positive and significant for trade facilitation and regulatory quality. This indicates that improvements in these policies will yield higher returns in terms of increased manufacturing exports in African countries than for the rest of the world. These results imply that a 10% improvement in trade facilitation index will, on average, yield a rise in manufacturing exports by 2.1% but in Africa the equivalent rise in the index will yield a rise of exports of over 6%²⁵. Similarly, a 10% increase in regulatory quality, as proxied by the contract enforcement index, yields a rise in exports by 5.7% in the whole sample of countries whereas an equivalent increase of the index increases exports originating from Africa by over 12%²⁶. Interestingly, the interaction variable on infrastructure yields insignificant estimates indicating that improvements in Africa’s infrastructure will yield improvements in export performance that are the same as those for the rest of the world.

As a robustness check to these results we have excluded South Africa from our African country sample and repeated the previous regression in column 2 of Table 4. The results are quantitatively similar to the once obtained in column 1 indicating that the results are robust to the exclusion of an African country with a significantly higher per capita manufacturing exports as well as divergent historical legacy and development pattern²⁷.

As a further robustness check we estimate the effects of on-the-border and behind-the-border trade costs on export performance while controlling for the level of development within our

²³ To illustrate this, we estimate the effect of going from 2750 kilometers to 3150 kilometers for trade (for example, being located in Senegal, trading to Spain, instead of Mauritania).

²⁴ From the estimators of column 1 of Table 2: $-17\% = (3150/2750)^{(-1.429)} - 1$; $-23\% = (3150/2750)^{(-1.429-0.107)} - 1$

²⁵ From the estimators of column 1 of Table 2: $(0.21 + 0.409)*100 = 6.19\%$ i.e. approximately 6%

²⁶ From the estimators of column 1 of Table 2: $(0.556+0.701)*100=12.557\% \approx 12\%$

²⁷ We would like to thank Dr. Lawrence Edwards for bringing up this point.

sample of countries. In column 3 of Table 4 we present the regression results where we replace the internal trade cost variables with estimated income conditional expected values of these indices²⁸. The results show that relative to the average level for its income cohort, better trade facilitation performance, improved regulatory quality and better infrastructure availability have a statistically significant, positive effect on export performance. This similar set of results to those in previous regressions indicates that our estimates were not significantly biased by multicollinearity or differential effects of diverse development levels.

Finally, the remaining regressions (columns 4-5) in Table 4 show results of the second-stage Heckman procedure with exporting countries constrained to Sub-Saharan Africa. The results further highlight our conclusions: policy variables that capture internal trade costs are more significant for Africa's manufacturing exports than for rest of the world exports. The magnitude of coefficients is significantly higher for Africa than for the whole sample of countries indicating that a 10 per cent rise in infrastructure availability, contract enforcement regulation or trade facilitation environment would increase Africans exports by around 17 per cent. Constraining the sample to African economies yields a significant rise in the trade facilitation variable which highlights the particular importance of improving custom procedures in Sub-Saharan Africa.

²⁸ The results of regressions specified in equation 2 are included in Appendix Table A2

Table 4: 2nd stage Heckman procedure regression results for the gravity model: Africa Effect

Explanatory Variables	(1)	(2)	(3)	(4) – Africa sub-sample	(5) – Africa – OECD
GDP	1.291*** (.011)	1.295*** (.011)	1.258*** (.011)	1.707*** (.083)	1.644*** (.093)
GDP partner	.807*** (.010)	.804*** (.010)	.455*** (.021)	-.615 (.247)	-.425* (.254)
Population	.158*** (.035)	.172*** (.032)	.197*** (.010)	.779** (.343)	.726* (.397)
Population Partner	.083 (.055)	.089 (.052)	.062 (.040)	.089*** (.020)	.052*** (.020)
Distance	-1.429*** (.027)	-1.421*** (.019)	-1.49*** (.021)	-2.167*** (.106)	-2.22*** (.130)
Remoteness	-.011*** (.001)	-.019*** (.002)	-.021*** (.001)	-.015* (.010)	-.012* (.006)
Tariffs	-.0133*** (0.06)	-.029*** (0.04)	-.025*** (.002)	-.024*** (.002)	-.004*** (.001)
Colony	.435*** (.101)	.434*** (.101)	.350*** (.102)		
Language	.891*** (.044)	.882*** (.044)	.943*** (.044)	1.175*** (.108)	1.27*** (.125)
Island	.043 (.040)	.031 (.041)	.064 (.040)	.555*** (.114)	.432*** (.141)
Border	.851*** (.099)	.867*** (.100)	1.042622 (.104)	1.307*** (.294)	1.186*** (.318)
Landlocked	-.257*** (.036)	-.245*** (.036)	-.277*** (.036)	.098 (.147)	.044 (.173)
RTA	.220*** (.014)	.223*** (.014)	.196*** (.014)		
Resources Dummy	-.737*** (.062)	-.771*** (.063)	-.747*** (.063)		
Trade Facilitation Contract	.210*** (.010)	.204*** (.010)	.461*** (.080)	1.647 (.577)	.760 (.588)
Enforcement	.556*** (.081)	.574*** (.081)	.862*** (.060)	1.438*** (.368)	1.878*** (.579)
Infrastructure	.727*** (.048)	.751*** (.049)	.872*** (.101)	1.271*** (.243)	1.683*** (.284)
GDP*Africa Dummy	.384*** (.027)	.396*** (.028)			
GDPPC*Africa Dummy	.00005*** (.000)	.0001*** (.00005)			
Distance*	-0.107*** (.076)	-0.122*** (.079)			
Africa Dummy	.409*** (.067)	.637*** (.079)			
Trade Facilit*	.701** (.392)	.771** (.394)			
Africa dummy	-2.783 (1.61)	-.518 (1.11)			
Contract Enf.*	-1.617*** (.089)	-1.62*** (.13)	-1.52*** (.078)	-1.36*** (.081)	-1.16*** (.035)
Selectivity Term (Mills Ratio)	18562	18562	18562	2059	1268
No. of Ob	R ² / Pseudo R ²	0.7056	0.7104	0.5226	0.5684
Prob > F	0.00	0.00	0.00	0.00	0.00

V. Summary and Conclusions

Despite the widespread adoption of trade liberalisation and lowering of average nominal tariff levels, Africa's trade performance has fallen well below expectations. The continent's share in world trade has declined over the past three decades and primary commodities continue to account for a large share of total exports.

The causes of Africa's marginalisation in world trade are complex and multiple, and improving the continent's integration with the global economy will require reforms directed at both external demand and internal supply determinants of trade performance. The challenge for policymakers is to focus reform interventions on the binding constraints on growth. The role of trade transaction costs in explaining export performance has received increasing attention in recent years, focusing particularly on trade facilitation costs. The purpose of this paper has been to assess the contribution that a reduction in trade facilitation could make to an improvement in Africa's export performance. Using a standard gravity model framework, we have shown that trade facilitation reforms can indeed contribute to improved export performance. However, other reforms, including the quality of the regulatory environment and the quality of the basic transport and communications infrastructure are also needed, and are often more important than on the border trade facilitation reforms in facilitating export growth. Furthermore, we have shown that improvements in on-the-border and behind-the-border policies yields a higher return in terms of increasing manufacturing export performance in African countries than in the rest of the world.

The policy implications of our results for improving the export performance of developing countries relate are several. The first is to confirm the contribution that trade facilitation reforms, which form the key element of the current 'aid for trade' negotiations, can make in raising the short to medium term supply elasticity of manufactured exports. The second is to highlight the need for complementary longer term regulatory and infrastructure reforms that will improve the quality of the institutional and physical infrastructure, thereby enhancing an economy's capacity to respond to the export market opportunities. These conclusions strongly suggest that the increased aid for trade resources that are now being allocated to SSA countries should allow for a broader interpretation of trade facilitation and recognise that the removal of the key constraints on export growth may require reforms that extend well beyond on-the-border customs procedures.

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Appendix:

Table A1: OLS regressions – Estimation of income conditional institutional variables

Dependent/ Independent Var	Trade Facilitation	Business Regulation	Contract Enforcement	Infrastructure
Ln GDPpc	.120*** (.001)	.0955*** (.000)	.092*** (.000)	.338*** (.002)
Ln POP	.009*** (.001)	-.0134*** (.000)	-.027*** (.000)	-.045*** (.001)
R-squared	0.23	0.52	0.31	0.51

Table A2: Correlation Matrix of dependant and independent variables

	tradeva	gdp	gdppc	gdppar	gdppcpar	tfindex	enforce	Bus. Reg	infral
Trade Value	1.0000								
GDP	0.1989	1.0000							
GDPpc	0.1494	0.3913	1.0000						
GDP par	0.2103	-0.0294	-0.0572	1.0000					
GDPpc Par.	0.1400	-0.0417	-0.1024	0.3984	1.0000				
Trade Fac.	0.0705	0.1678	0.5211	-0.0440	-0.0799	1.0000			
Contract Enf.	0.0612	0.1571	0.4407	-0.0175	-0.0235	0.2036	1.0000		
Bus Reg	0.0930	0.2844	0.4522	-0.0158	-0.0320	0.5368	0.5242	1.0000	
Infrastruct.	0.1083	0.2069	0.8868	-0.0540	-0.0969	0.6553	0.6585	0.3955	1.0000

Table A3: Country Sample*

Albania	Ecuador	Kyrgyz Republic	<i>Seychelles</i>
Algeria	El Salvador	Lebanon	Singapore
Andorra	Estonia	Latvia	Slovak Republic
Azerbaijan	Fiji	Lithuania	Slovenia
Argentina	Finland	<i>Madagascar</i>	<i>South Africa</i>
Australia	France	<i>Malawi</i>	Spain
Austria	<i>Gabon</i>	<i>Malaysia</i>	<i>Sudan</i>
Bangladesh	Georgia	<i>Mali</i>	Suriname
Armenia	<i>Gambia, The</i>	<i>Mauritania</i>	Sweden
Belgium	Germany	<i>Mauritius</i>	Switzerland
Bolivia	<i>Ghana</i>	Mexico	Syrian Arab Republic
Bosnia and Herzegovina	Greece	Mongolia	Thailand
Brazil	Guatemala	Moldova	<i>Togo</i>
Belize	Guyana	Morocco	Trinidad and Tobago
Bulgaria	Honduras	<i>Mozambique</i>	United Arab Emirates
<i>Burundi</i>	Hong Kong, China	Oman	Tunisia
Belarus	Hungary	Netherlands	Turkey
Cambodia	Iceland	New Zealand	<i>Uganda</i>
Canada	India	Nicaragua	Ukraine
<i>Cape Verde</i>	Indonesia	<i>Niger</i>	Macedonia, FYR
<i>Central African Republic</i>	Iran, Islamic Rep.	Norway	Egypt, Arab Rep.
Sri Lanka	Ireland	Pakistan	United Kingdom
Chile	Israel	Panama	<i>Tanzania</i>
China	Italy	Paraguay	United States
Colombia	<i>Cote d'Ivoire</i>	Peru	<i>Burkina Faso</i>
Costa Rica	Jamaica	Philippines	Uruguay
Croatia	Japan	Poland	Venezuela
Czech Republic	Kazachstan	Portugal	Yemen
<i>Benin</i>	Jordan	Romania	<i>Zambia</i>
Denmark	<i>Kenya</i>	Russian Federation	<i>Zimbabwe</i>
	Korea, Rep	<i>Senegal</i>	Dominica

*Counties in *italics* are from Sub-Saharan Africa

Table A4: 1st Step Heckman Procedure

<i>OLS and Probit: 1st Step Heckman Procedure</i>				
Regression	Censored Sample	Probit	Censored Sample	Probit
Explanatory Variable	(1)	(2)	(3)	(4)
GDP	1.452*** (.013)	.623*** (.013)	1.135*** (.015)	.621*** (.013)
GDP partner	-.041 (.035)	.434*** (.011)	.035 (.024)	.417*** (.011)
Population	.753*** (.015)	-.395*** (.026)	.837*** (.0153)	-.294*** (.026)
Population partner	.055*** (.022)	-.031 (.015)	.055*** (.022)	-.025* (.015)
Distance	-1.35*** (.074)	-.588*** (.025)	-1.833*** (.025)	-.566*** (.024)
Remoteness	-.016*** (.003)	-.023 (0.02)	-.003*** (.001)	-.012*** (.002)
Tariffs	-.031*** (0.03)	-.012*** (.002)	-.013*** (0.02)	-.013*** (.001)
Colony	1.01*** (.145)	-.564*** (.073)	.945*** (.134)	-.586*** (.072)
Language	.372*** (.104)	.371*** (.049)	.434*** (.092)	.386*** (.048)
Island	.943 (.024)	.184*** (.031)	.882*** (.039)	.170 (.031)
Border	.075* (.043)	-.223 (.158)	.204*** (.032)	-.178 (.156)
Landlocked	-.341*** (.034)	-.024 (.028)	-.324*** (.029)	-.044 (.028)
RTA	.189*** (.012)	.026 (.026)	.183*** (.012)	.027 (.025)
Dummy Africa	.129 (.087)	.302 (.297)	.092 (.069)	.375 (.268)
Dummy	-.712*** (.064)	-.189*** (.012)	-.893*** (.053)	-.189*** (.012)
Resource Exp. Trade	.302*** (.004)	.979*** (.121)	.354*** (.005)	.205*** (.061)
Facilitation Business Regulation	.682*** (.075)	1.242*** (.082)		
Contract Enforcement			.783*** (.072)	.846*** (.027)
Infrastructure	.732*** (.065)	1.32*** (.027)	.773*** (.049)	1.707*** (.111)
Common Religion	.584 (.370)	.455*** (.060)	.492 (.255)	.349*** (.059)
No. of Ob	18702	24457	18702	24457
R ² / Pseudo R ²	0.7153	0.4173	0.7645	0.4383
Prob > F	0.00	0.00	0.00	0.00

*-For all tables * indicates significance at 10%, ** at 5% and *** at 1% level, respectively. Robust standard errors in parenthesis for GLS.