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Beyond Tariffs and Quotas:
Why Don't African Manufacturers Export More?

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Abstract

There has been much concern about Africa's recent export performance. Even though tariff and non-tariff barriers to trade have been falling, Africa's share of world exports has declined and most African countries remain highly dependent upon a narrow range of primary commodities for export earnings. This article looks at factors that affect the export performance of manufacturing enterprises in eight African countries. In addition to enterprise characteristics (e.g., size, ownership and education of the manager), policy-related variables also affect export performance. Manufacturing enterprises are less likely to export in countries with restrictive trade and customs regulation and poor customs administration. In contrast, there is less evidence that the quality of domestic transportation infrastructure has a large impact on export performance. Although the coefficient on this variable is negative, it is statistically insignificant in most model specifications.

I.   INTRODUCTION

Countries in Sub-Saharan Africa often export narrow ranges of products (Collier, 1998). A recent study noted that in the late 1990s, 39 of 47 of African countries depended on two primary commodities for over half of their export earnings (Morrissey and Filatotchev, 2000). As a result, these countries are highly susceptible to terms-of-trade shocks. Diversifying exports away from primary commodities into labor-intensive manufacturing, which currently accounts for only a relatively modest share of GDP and an even more modest share of exports, could reduce this vulnerability.

In addition to reducing vulnerability to shocks, increasing exports might boost income by increasing economic growth.[1] Exporters tend to be more efficient than non-exporters— something that holds for the enterprises in this study.[2] If the enterprise-level correlation between exporting and efficiency is due to exporting improving productivity, increasing exports might increase income. There has been considerable debate over whether this is the case—the correlation could also simply be due to productive enterprises self-selecting into exporting. Under the first hypothesis, the *learning-by-exporting* hypothesis, the discipline of competing in international markets encourages enterprises to improve their productivity and exposes them to foreign technologies and modes of production. Under the second hypothesis, the *self-selectivity* hypothesis, only firms that are already efficient are able to export. Although inefficient firms are protected from international competition in domestic markets by natural barriers (e.g., high transportation costs) and policy barriers (e.g., government tariffs and quotas) to trade, they are unable to enter international markets. It is important to note that the two hypotheses are not mutually exclusive. Even if more productive enterprises self-selected into exporting, it would still be possible that exporting results in further productivity improvements.

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[1] Söderbom and Teal (2003) find that exports—although not manufacturing exports in particular—were associated with income growth in nine countries in Sub-Saharan Africa.

[2] Several investment climate assessments, which calculate productivity data for the firms in this study have found evidence consistent with the idea that exporters are more efficient. See, for example, World Bank (2004a) for Tanzania. These studies are available on the World Bank's website (http://www.worldbank.org/ privatesector/ic/ic_ica.htm). A similar relationship has been observed in many developing and developed countries. The large literature on this topic is summarized in Tybout (2003).

Although there is no definitive answer as to which hypothesis better explains the higher productivity of exporters, recent enterprise-level studies have found evidence consistent with the learning-by-exporting hypothesis in Africa.[3] Using enterprise-level data from the mid-1990s for Cameroon, Ghana, Kenya, and Zimbabwe, Bigsten *et al*. (2004), who use simultaneous equations estimation to control for reverse causation, find that exporting results in efficiency gains.[4] In addition, Mengistae and Pattillo (2004) find that direct exporters and firms that export outside of Africa are more productive than other exporters, which they interpret as consistent with the learning-by-exporting hypothesis. If exporting resulted in productivity improvements, policies that promote exports—or at least remove biases that discourage exports—might improve productivity and ultimately result in higher wages and income.

Although manufacturing enterprises in many African countries have been relatively unsuccessful in export markets, there are significant differences between countries. For example, both macroeconomic data and the firm-level data used in this project suggest that manufacturing enterprises in Senegal and Kenya are more successful than enterprises in Ethiopia, Mali and Mozambique. This paper uses enterprise-level data from eight countries—Ethiopia, Kenya, Mali, Mozambique, Senegal, Tanzania, Uganda and Zambia—to explore different factors that affect export performance. In particular, the paper looks at enterprise characteristics, trade policy and the quality of transportation infrastructure.

The paper finds that despite significant reductions in tariff and non-tariff barriers, government policies, including restrictive trade and customs regulations and poor customs administration, continue to discourage exporting. Improving policy in these areas could have a large impact—reducing trade and customs regulations from the level observed in the second

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[3] Results from other countries are inconclusive. Using data from Columbia, Mexico and Morocco from the 1980s and early 1990s, Clerides (1998) conclude that the evidence supports the self-selection hypothesis, while providing little support for the learning by exporting hypothesis. Bernard and Jensen (1999) and Liu *et al.* (1999) find similar results for the United States and Taiwan, China. Aw *et al.* (2000), using data from the 1980s and early 1990s, find some evidence to support the learning-by-exporting hypothesis for some industries in Taiwan, China but no evidence to support it for Korea. Other studies, however, do find evidence consistent with learning by exporting. Kraay (1999) and Fajnzylber (2004) finds evidence or learning among Chinese and Brazilian enterprises respectively. Finally, using data from Indonesia, the Philippines, Thailand, Malaysia and Korea, Hallward-Driemeier *et al.* (2002) find that exporters take concrete steps to improve productivity before they enter export markets (e.g., training employees and using foreign technology). They interpret this as suggesting that firms try to pass the threshold to enter such markets.

[4] Bigsten *et al*. (2004) also find evidence consistent with the self-selectivity hypothesis.

most restrictive country (Tanzania) to the level observed in the second least restrictive (Zambia) would increase exports as a share of production by over 4 percentage points for the average enterprise in the sample. Given that most firms export only a small part of their output—about 12 percent on average—this is large. Improving the quality of domestic transportation infrastructure and the reliability of transportation services might also improve export performance—although the coefficients on these variables are generally statistically insignificant.

Differences in trade policies, the quality of transportation infrastructure, and enterprise characteristics partly explain the differences in export performance. However, even after controlling for these factors, differences remain. For example, even though a significant share of manufacturing exports in Africa are to neighboring countries, exports from land-locked countries appear lower than exports from other countries.

II. EXPORTING AND BARRIERS TO TRADE

II.1 Manufacturing Exports in Sub-Saharan Africa

Manufacturing accounts for only a relatively modest share of value-added in most countries in Sub-Saharan Africa. In the eight countries included in this paper, manufacturing value-added was equal to only about 11 percent of GDP in 2002 (see Table 1). In comparison, manufacturing accounted for about 25 percent of GDP in three relatively successful Asian economies where investment climate assessments have been completed.

The difference between the successful Asian economies and Sub-Saharan Africa is even more noticeable when looking at manufacturing exports. Manufacturing exports were equal to about 18 percent of GDP in the three Asian countries—compared to an average of only 3 percent of GDP for the countries in Sub-Saharan Africa (see Table 1). In four of the seven countries in Sub-Saharan Africa where data were available, manufacturing exports were equal to less than 2 percent of GDP.

The data from the mostly small and medium-sized enterprises included in the Investment Climate Surveys—the surveys used in the analysis in this paper—are broadly consistent with the macroeconomic data.[5]   Manufacturing enterprises included in the surveys were less likely to export in most of the countries in Sub-Saharan Africa than similar enterprises in Asia. Furthermore, enterprises in Sub-Saharan Africa also exported less as a share of total output— only about 12 percent on average—compared to about 22 percent of output in Asia (see Table 2).

Although the average is relatively low for the eight countries in Sub-Saharan Africa, it is important to note that there are large differences between countries within Africa. For example, manufacturing enterprises export more in Senegal, Kenya and Zambia than in the other countries for which data were available.   Whereas 58 percent of Kenya enterprises and 43 percent of Senegalese enterprises included in the samples were involved in exporting, only 7 percent of firms in Ethiopia and 12 percent of firms in Mozambique did the same.

In principle, the large pools of workers with relatively modest levels of education in most countries in Sub-Saharan Africa would appear to make these countries attractive platforms for exporting labor intensive goods to capital-rich industrialized economies. In practice, however, the small and medium-sized enterprises included in the Investment Climate Surveys mostly export to neighboring countries within Sub-Saharan Africa rather than to Western Europe or other industrialized economies. In all countries other than Ethiopia, enterprises were more likely to export to neighboring countries than they were to export to more distant European markets (see Table 3). This pattern appears to be true for both landlocked countries (e.g., Uganda and Zambia) and countries with access to the sea (e.g., Tanzania and Kenya).

Although Ethiopia appears to be an exception to this general rule—Italy, the United Kingdom and Germany are the three most important export destinations for Ethiopian enterprises—it is important to note that very few Ethiopian enterprises export at all (see Table 2). Although over 50 percent of exporters in Ethiopia export goods to their main industrial market (Italy), this represents less than 4 percent of Ethiopian enterprises. In contrast, although only

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[5] Given that a small number of large enterprises are responsible a large share of exports in most countries, it would be possible that the unweighted average for the small and medium enterprises included in the Investment Climate Assessments could be quite different from the macroeconomic data.

about 8 percent of Kenyan exporters export to their main industrial market (the United Kingdom), since 58 percent of Kenyan enterprises export, this represents over 4 percent of Kenyan enterprises. The poor performance of Ethiopian exporters in regional markets probably reflects regional difficulties that have prevented Ethiopian enterprises from developing export partnerships with firms in neighboring countries (e.g., in Eritrea, Somalia and Sudan).

II.2 Barriers to Trade

Many different factors affect firms' propensities to export. Since the cost of transportation will vary between sectors, enterprises will be more likely to export in some sectors than they will be in others. Similarly, enterprise size is likely to be important—there are fixed costs associating with exporting that larger enterprises will find it easier to bear. Finally, transportation costs will vary between countries. Although exporting will generally be more difficult for enterprises in landlocked countries, it is important to note that most of the small and medium enterprises included in the investment climate surveys export to neighboring countries (including neighboring landlocked countries) rather than to more distant markets.

Another factor that might affect export performance is the existence of policy-induced barriers to trade. Export taxes are the most direct policy-induced barrier. In practice, however, export taxes—which were mostly levied on primary production in any case—have become far less important in recent years. For example, Senegal eliminated export taxes in the mid-1980s and Uganda abolished export taxes in the mid-1990s.[6]

In addition to export taxes, tariffs and non-tariff barriers on imports might also affect exports. By increasing the cost of imports, they will divert resources towards import substituting activities, discouraging exports. In addition, if firms find it more costly to import intermediate and capital goods, this will increase production costs. Although exporters are often entitled to reimbursement of import duties under duty drawback schemes, these schemes are often complex and are administered inefficiently (Collier, 1998). Tariffs might also discourage exports, if

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[6] Mbaye and Golub (2003) note that Senegal had few export taxes other than on groundnuts and gold and that these were eliminated in 1985. Similarly, Grenier *et al.* (1999) note that export duties had become uncommon by the mid-1990s in Tanzania. Milner *et al.* (2000) note a similar point for Uganda.

exporters are particularly reliant upon imported inputs.[7] If domestically produced goods are lower quality than imported goods (especially from industrialized economies), this might make it difficult for exporters to produce goods to international standards when imports are restricted.

In practice, tariffs have been falling throughout much of the region over the past decade for capital goods, intermediate goods and total imports. Among the seven countries in this study for which data were available, average tariff rates fell for all three categories in six of them (see Table 4). In the final country, Mali, tariff rates increased slightly for capital goods and for overall trade and increased more significantly for intermediate goods. However, this appears to be partially due to tariff rates being relatively low in the mid-1990s. As a result, average rates in Mali were comparable to rates in the other countries by the early 2000s. Furthermore, tariff rates do not appear any higher in Africa than in the more successful exporters in East and South Asia. In fact, except for the Philippines where rates are significantly lower than elsewhere, average tariff rates were generally lower in Africa than they were in East and South Asia.

Tariffs and non-tariff barriers are not the only policy-related barriers to trade. In addition to these barriers, customs and trade regulations can also affect exports and imports. In many developing countries, it takes a relatively long time for exports and imports to clear customs procedures and in some countries additional informal payments to customs officers are needed to ensure timely processing. In addition to long processing times, the paperwork associated with importing and exporting can be burdensome (Milner *et al.,* 2000). Further, some enterprises need to complete additional procedures, such as getting import or export licenses, to import intermediate inputs, raw materials or capital goods and to export their final production. Finally, rebates under duty drawback schemes and for value-added taxes are often slow, sometimes for less than the full amount and even can require additional informal payments or bribes in some cases.

Although it is difficult to quantify all aspects of trade and customs regulations, the investment climate surveys include some questions that address these questions. The most direct

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[7] In the sample of firms in this surveys exporters are more likely to use imported intermediate inputs than non-exporters. Imports account for 50% of inputs for exporters, compared to 37% for non-exporters. This is consistent with results for Tanzania in Grenier *et al.* (1999)

way that the investment climate surveys address these issues is by asking enterprises how great a burden trade and customs regulations are to enterprise operations and growth. In most of the countries covered by this study, enterprises involved in exporting were significantly more likely to say that trade and customs regulations were a serious obstacle than exporters in the three Asian economies (see Table 5). Whereas about 40 percent of enterprises involved in exporting claimed that customs and trade regulations were a serious obstacle in the eight African countries, only 28 percent of exporters did the same in Asia.

Enterprises involved in exporting were more likely to complain about trade and customs regulations than non-exporters. Whereas about 40 percent of exporters said that trade and customs regulations were a serious obstacle, only 33 percent of non-exporters said the same. This pattern held for most of the individual country samples and also held in the Asian economies. This is not surprising—exporters would seem to be more likely to have to interact with customs and trade officials and to comply with regulations than enterprises not involved in exporting.

In addition to the qualitative questions, enterprises were also asked several quantitative questions about trade and customs regulations. One question that was asked on all of the surveys was the longest and average time that it takes imports and exports to clear customs after arriving at the point of entry or exit in their country.[8] Although some countries, such as Zambia and Uganda, appear to perform relatively well with respect to delays, the average delay for both imports and exports is significantly longer in many of the African countries than in China or the Philippines (see Table 5). Enterprises were more likely to report that customs and trade regulations were a serious obstacle in countries where processing delays were longer. The cross-country correlation between the percent of exporters that rated trade and customs regulations as a major obstacle and days to clear customs for exports and imports are 0.52 and 0.49 respectively.

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[8] Consequently, it can include delays other than delays simply due to customs procedures (e.g., port delays). It is important to note, however, that most exporters in the sample countries export to neighboring countries. The reason that the question is asked in this way is that entrepreneurs typically know only the total delay, not who is responsible for it. This is especially likely to be true when they use agents to process imports or exports.

With respect to export delays, only one of the eight African countries performs better than the Philippines and only three perform better than China. Even this is likely to underestimate the relatively poor performance of customs administration in the African countries since the point of exit for most exports from China and the Philippines will be a port and, therefore, the delays will include port delays.[9] In contrast, several of the African countries (including Zambia and Uganda the two best performers) are landlocked—meaning all exports will clear customs at a land border.[10] Further, as noted above, for most of the African countries neighboring countries are the most important export partners for the firms in the Investment Climate Surveys.

Although customs delays reflect one aspect of the burden associated with trade and customs regulations, they are not the only aspect of trade regulation that is burdensome and costly for enterprises involved in exporting. Further, as noted above, trade regulations that make importing more difficult might also discourage exporting. If trade regulations make it more difficult for exporters to get imported capital and intermediate inputs—and hence to meet international standards in these respects—restrictions on imports will also discourage exporting.

Most firms that use imported goods use clearing agents to help arrange for customs clearance. Over 85 percent of enterprises that used imported inputs reported that they used clearing agents to help with these procedures (see Table 6). The median cost of hiring a clearing agent in Zambia—the only country where the survey asked about the cost—was about 1 percent of the shipment value.

In addition, many companies reported that they had had to obtain (at least one) import license within the two years prior to the survey (see Table 6). In most countries, the average wait to get a license was about a week and in some countries it was close to two weeks. About 10

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[9] In contrast to the African countries, the most important markets for Chinese goods are overseas (i.e., China does not share a land border with its most important markets). Although the most popular destination for 'exports' from China was Hong Kong, the three next most important destinations were the United States (32% of exporters rated it among their 3 most important destinations), Japan (31%) and Germany (10%). Since the Philippines has no land borders with any other country, all Philippine exports will ultimately be shipped overseas.

[10] The survey asks about clearing customs in their own country not at the outgoing port if they are later shipped from a neighboring country (e.g., Ugandan exports from Mombasa or Dar es Salaam).

percent of enterprises reported that informal payments or gifts were requested or expected when applying for a license. The Zambia survey also asked whether licenses were needed for each consignment or whether licenses covered all consignments over a set period. About 70 percent of enterprises reported that they needed licenses for each consignment.

Export procedures can also be burdensome. For example, exporters in Mozambique need to obtain a certificate of origin, a certificate of quality, a sanitary and phytosanitary certificate and an export license, which is needed for each transaction, before exporting (Nathan Associates, 2002). The certificate for quality and the sanitary and phytosanitary both require inspections. Only the survey for Zambia asked specific questions about export licenses and permits. About 52 percent of exporters in Zambia reported that they needed export licenses, with about 90 percent of these reporting that they needed a license for each consignment (as opposed to getting a license that covered all consignments over a set period of time). The average wait for an export license was 5 days. In addition to this, about 45 percent of enterprises reported that their exports were subject to special regulations.

Many countries offer exporters special incentives, such as duty drawback schemes. Although duty drawback schemes (schemes that refund custom duties for goods that are exported) can encourage exports, their application has often been difficult in developing countries. In particular, the schemes are often complex and poorly administered, resulting in high transaction costs for firms involved in these programs.[11] Weak administration and fiscal problems often result in long delays before they receive refunds. For the two countries where questions were asked about delays in receiving refunds, Ethiopia and Zambia, the average waits between filing and receiving refunds were 74 and 93 days respectively.[12] Similar problems are common for other refunds. For example, in almost all countries with value-added taxes, including all the countries covered in this study except Ethiopia where value-added taxes had not been imposed at the time of the survey, exports are zero-rated. As a result, many exporters will

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[11] See, for example, Milner *et al*. (2000) on Uganda

[12] These delays can prevent firms from investing. For example, when one firm in an Export Processing Zone in Mozambique imported equipment that should have been exempt from customs duty and VAT, it found out that it would be required to pay nearly $20,000 in duties and taxes before picking up the equipment. The manufacturer then refused to pick up the machinery since this could tie up its working capital for up to a year (Nathan Associates, 2002).

be eligible for VAT refunds. Once again, the delays can also be long for VAT refunds—delays between filing for refunds and receiving the refunds averaged 44 days in Mozambique and 113 days in Zambia.

III. EMPIRICAL RESULTS

III.1 Data

The data used in this study come from Investment Climate Surveys, surveys of manufacturing enterprises conducted by the Regional Program on Enterprise Development (RPED) unit of the World Bank, in collaboration with local partners within the countries. The surveys, which were conducted in 2002 or 2003, cover Ethiopia, Kenya, Mali, Mozambique, Senegal, Tanzania, Uganda and Zambia. Firms from eight industries were included in the surveys: Agro-industry; Chemicals; Construction Materials; Wood, Wood Products and Furniture; Metals; Paper, Printing and Publishing; Plastics; and Textiles, Leather and Garments.[13]

The surveys were conducted in a uniform way across countries, using stratified random samples. The sampling frames were stratified across location within each country, sub-sector, and size. [14] When recent census data were available, the random samples was constructed using census data. If recent census data were not available, the lists were constructed using lists of enterprises from government agencies (e.g., from the National Bureau of Statistics in Tanzania). As a result, the surveys ultimately cover the 'formal' manufacturing sector—firms need to be registered with the government to be included. When firms could not be located or refused to participate in the survey, they were replaced with new firms with as similar characteristics (in terms of size, sector, and location) as possible. Table 7 presents summary statistics for the main variables included in the analysis by country.

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[13] In addition, some machinery firms were included in the sample for Kenya. Since this sector was not covered in the other countries, they are dropped from the analysis.

[14] The size categories are: very small (0-9 employees), small (10-49), medium (50-99), large (100-499) and very large (over 500 employees).

III.2 Methodology

To look at the question of the effect of trade regulation, infrastructure development, and enterprise characteristics on export share, we use firm-level data for firm i in sector j in country k to estimate the following equation:

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\text{Exports}_{ij} = \begin{cases} 100 & \alpha+\beta\text{obstacle}_{ijk} +\partial_j X_{ijk} +\gamma_j +\lambda_k +\varepsilon_{ijk} >100 \\ \alpha+\beta\text{obstacle}_{ijk} +\partial_j X_{ijk} +\gamma_j +\lambda_k +\varepsilon_{ijk} & \text{if} \quad \text{otherwise} \\ 0 & \alpha+\beta\text{obstacle}_{ijk} +\partial_j X_{ijk} +\gamma_j +\lambda_k +\varepsilon_{ijk} <0 \end{cases} \quad (1)
$$

The dependent variable is exports as percent of sales. Since, as noted previously, many enterprises do not export any part of their production, this variable is censored below at 0. Since a few, but not very many, enterprises export all their production, it is also censored above at 100. The model is estimated as a two-limit Tobit model, using standard maximum likelihood estimation.

One of the questions of interest is how enterprises' exporting is affected by problems related to trade and customs regulations. The regressions therefore contain variables proxying for the obstacle that trade regulations impose upon the enterprise. The data that we use to measure the burden imposed by trade and customs regulations is the perception-based data described in the previous section.

One concern about perception-based data is that it might not accurately reflect reality. Although this is a concern, it is important to note that if perceptions have no base in reality, we would not expect to find any relationship between perceptions about trade and customs regulations and export decisions (i.e., if perception data was simply white noise, the coefficient on the variable would be statistically insignificant). However, there is some concern about endogeneity—enterprise managers with greater experience with dealing with customs and trade regulations (e.g., exporters) might have different perceptions about these regulations than enterprise managers without the same level of experience. Consequently, export behavior might affect perceptions rather than the reverse. Further, customs and trade regulations are likely to impose a greater burden (and hence actually be a greater obstacle) for exporters than non-exporters. Consistent with this, exporters are more likely to complain about trade and customs

regulations than non-exporters are (see Table 5). This makes intuitive since excessive trade regulations will impose greater constraints for enterprises involved in exporting than for enterprises that only operate in domestic markets.

We attempt to control for this in two ways. First, rather than using the enterprises' own assessment of the obstacle, we substitute this with the average assessment of enterprises involved in exporting in the same sector and region as the enterprise. In addition to reducing concerns about endogeneity, using average perceptions should also clean out white noise associated with the perceptions of the individual manager. Second, we implement a Generalized Least Squares procedure for Tobit models allowing these variables to be determined endogenously.[15] Two sets of instruments are used in this part of the analysis: (i) the average assessment of trade and customs regulation for enterprises in the same sector and region that are involved in exporting and (ii) the average and maximum times for imports and exports to clear customs for firms in the same sector and region. The second set of instruments is particularly interesting. Since it is not perceptions based (i.e., it is based upon actual experience with customs administration), it is not subject to the same concerns as perception-based data.

In addition to the variables representing trade and customs regulations, the regressions also include a series of additional control variables. First, all regressions include a set of sector dummies (γ_j) to control for differences between manufacturing sub-sectors with respect to export behavior. For example, some products might be more difficult to transport than other products, limiting export potential. Second, the regressions include a series of enterprise-level controls (X_{ijk}) including enterprise size (proxied by number of employees), age of the enterprise, dummies indicating whether the enterprise in state or foreign-owned and a dummy variable indicating whether the enterprise manager has a university education. Finally, the regressions also include a series of country dummies to control for differences between countries that might

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[15] The procedure that we use is the IVTOBIT routine written for STATA by Joe Harkness at John Hopkins University. It implements Amemiya's GLS estimated using formulas from Newey (1987)

affect enterprises' export opportunities. For example, enterprises located in land-locked countries might find it more difficult to export than enterprises located in other countries.[16]

III.3   Results

Customs and Trade Regulations.   Although most countries have reduced tariffs, export taxes and other formal barriers to trade, customs and trade regulations remain a serious concern in many countries in Africa. When the enterprise's assessment of the extent of problems due to customs and trade regulation is included directly in the regression, the coefficient is positive but statistically significant (see Table 8). Results are similar whether country dummies are included (see column 2) or excluded (see column 1). Since higher values on the index indicate that the enterprise believes that trade and customs regulations are a greater barrier, this suggests that firms that perceive customs and trade regulations as a greater barrier export more than enterprises than believe them to be a lesser barrier. Although this might seem counter-intuitive at first glance, it is probably not surprising. As noted earlier (see Table 5), enterprises involved in exporting are more likely to be concerned about trade and customs regulations than enterprises that operate wholly in domestic markets.

To control for the possibility of reverse causation, the regressions are repeated substituting the average rating of trade and customs regulation for exporters in the same region and sector as the enterprise of interest. Since this does not depend upon whether the enterprise actually exports or not, reverse causation is unlikely. When this variable is substituted for the enterprise's own perception, the coefficient is statistically significant and negative. This indicates that enterprises in sectors and regions where trade and customs regulations are particularly problematic export less than other enterprises. The effect is relatively modest, however. The point estimate of the coefficient suggests that a 1-point average increase in the

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[16]   Wood and Jordan (2000) note that it is 870 miles from Kampala to the nearest port, Mombasa (in Kenya). Overall, they argue that poor infrastructure partially explains why Uganda exports less manufacturing goods than Zimbabwe. However, as noted above, it is important to note that most exports for the small and medium-sized enterprises in the investment climate surveys are to neighboring countries.

index decreases average exports by about 2.2 percentage points.[17] It is important to note, however, that a 1-point average increase on the index is relatively large. For example, increasing the obstacle due to trade and customs regulations from the average level observed for exporters in Zambia, the country with the second lowest average score, and Tanzania, the country with the second highest, would result in an increase of only about 0.6 points on the index – and hence a 1.3 percentage point increase for exports.

Rather than simply substituting the average index for the enterprises' own perceptions, we also re-estimate the regressions treating the enterprise's perceptions as endogenous. As a first approach, we use the average ranking as an instrument. The coefficient increases significantly in size and remains statistically significant, whether country dummies are included in the regression or not (see columns 1 and 2 of Table 9). Furthermore, they are about three times larger than the coefficients on the average obstacles are when the obstacles are included directly.[18] These results suggest that a 0.6 point increase on the index (the difference between Zambia and Tanzania) would increase exports for the average enterprise by about 4.7 percentage points.[19]

Results are similar when objective measures of customs and trade regulations are substituted as instruments for the averages of the subjective indices. When average and maximum delays for the time it takes goods to clear customs for enterprises in the same region and sector are substituted for the average perceived obstacle, the coefficients are larger in absolute value and remain statistically significant and negative. Hypothesis tests reject the null hypothesis that the perceived obstacles are exogenous, favoring the results in Table 9 over the results in columns 1 and 2 of Table 8.[20]

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[17] This is the change in the unconditional expected value of actual exports (i.e., not the underlying latent variable that could be negative). The change is calculated using the coefficient estimates from Column 4 of Table 8 and setting all variables (other than the variable of interest) to their average values. See Cong (2001) for more detail.

[18] This is consistent with the idea that coefficients on the average perceived obstacles are biased downwards due to measurement error.

[19] Using point estimates of the coefficients from column 2 of Table 9.

[20] The test is the test proposed by Smith and Blundell (1986). In all four regressions (i., with both sets of instruments and with and without country dummies), the null hypothesis that the index of obstacles due to trade and customs regulations is exogenous is rejected at a 1 percent level or higher.

Size. The large fixed costs associated with setting up an international distribution or service network will generally make exporting easier for large enterprises. Further, large enterprises generally have better access to finance than small enterprises—especially in developing countries—making it easier for them to finance these costs.[21]

Several studies have found that large enterprises are more likely to export than smaller enterprises in low and middle-income countries. For example, Clerides *et al.* (1998) find evidence consistent with this for Colombia, Mexico and Morocco. Similarly, Grenier *et al.* (1999) found that large Tanzanian enterprises export more than smaller enterprises. Finally, using data from several countries in sub-Saharan Africa from the mid-1990s, Bigsten *et al.* (2004) and Söderbom and Teal (2003) found similar results. The results of this study are consistent with these earlier results. The positive and statistically significant coefficient on enterprise size indicates that large enterprises export more than smaller enterprises do. The point estimate indicates that a 1-point increase on the log-scale (e.g., from about 20 workers to about 54 workers) increases exports by about 4.3 percentage points.

Ownership. It is unclear whether state ownership will encourage or discourage exporting. On the one hand, state-owned enterprises might be less likely to enter export markets than similar private enterprises are. Many studies have shown that state-owned enterprises are less efficient on average than private enterprises, especially in competitive industries.[22] This might prevent state-owned enterprises from entering export markets—although barriers to trade allow inefficient firms to operate in domestic markets, it is more difficult for them to operate in international markets. On the other hand, state-owned enterprises might be better able to negotiate their way past regulatory barriers and might find it easier to access government programs designed to encourage exports. In practice, the evidence for Africa is mixed.[23] The results from this study suggests that state-owned enterprises are significantly less likely to export

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[21] See Schiantarelli (1996) for a review of the literature on firm size and financial constraints.

[22] Shirley and Walsh (2001) and Megginson and Netter (2001) survey the large literature on this topic, finding that private enterprises are more efficient than similar state-owned enterprises on average in low and middle-income countries.

[23] Using data from the early 1990s, Grenier *et al.* (1999) find that state-owned enterprises in Tanzania were more likely to export. They note, however, that Bigsten *et al.* (1997) did not find similar results

than similar private enterprises. On average, state-owned enterprises export about 7 percentage points less of their output than similar private enterprises do.[24]

It is generally assumed that foreign-owned enterprises will find it easier to export than similar domestically owned enterprises. Foreign-owned enterprises might have easier access to international marketing and distribution networks, especially when the foreign owner is affiliated with a multinational corporation, making it easier for them to enter international markets (Blomström and Kokko, 1998, p. 7). Similarly, foreign-owned enterprises might have better access to finance, making it easier for them to bear the fixed costs associated with entering export markets.[25] The effect of foreign ownership on export behavior might be especially important in developing or transition economies, since domestic enterprises in these countries might be more likely to lack the skills and resources needed to set up marketing, distribution and service networks. Some studies have found that foreign-owned enterprises are more likely to export than domestically owned enterprises in Africa. For example, Grenier *et al.* (1999) find weak evidence that foreign owned enterprises in Tanzania are more likely to export.

The coefficient on the dummy variable indicating that the enterprise is foreign-owned is positive and statistically significant in the regressions in Table 8 and Table 9. This suggests that foreign-owned enterprises export more than similar private domestically owned enterprises. The (positive) impact of foreign ownership is more modest than the (negative) impact of state ownership. On average, foreign owned enterprises export about 3.4 percentage points more of their output than similar domestically owned enterprises in the countries in this sample.

Age. Older firms do not appear to export more, or less, than similar younger firms. The coefficient on the age of the establishment is small, statistically insignificant and positive when customs and trade regulations are treated as exogenous and small (see Table 8), statistically

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[24] Differences are the change in the unconditional expected value of the observed (rather than the latent) variable when the dummy variable is set to one (rather than to zero). The change, which is a non-linear function of the independent variables, is calculated using the coefficient estimates from Column 4 of Table 8 and setting all variables (other than the variable of interest) to their average values. Cong (2001) describes the calculations.

[25] Foreign-owned enterprises might have better access to finance either because they are perceived to be more efficient than other enterprises or because they have access to finance in their home countries. Cotton *et al.* (2004) and World Bank (2004a) present evidence consistent with the idea that foreign-owned enterprises are less constrained by access to finance for Uganda and Tanzania respectively.

insignificant and negative when customs and trade regulations are treated as endogenous (see Table 9).[26]

Internet Use. Previous work on low and middle-income countries in Europe and Asia has shown that manufacturing enterprises that are connected to the Internet export more than non-connected enterprises.[27] A similar relationship appears to hold for the African enterprises in this study. Enterprises that used the Internet to communicate with customers and suppliers were considerably more likely to export than other enterprises were. The impact appears to be large. The point estimate of the coefficient suggests that the average enterprise would export about 11 percentage points more of its output if it had an Internet connection than if it did not. One concern about this variable is that it might be endogenous—the high cost of international communications in Africa might encourage exporters to get Internet connections rather than Internet connections making it easier for enterprises to export. The main results in this paper, however, are robust to the exclusion of this variable.

Human capital of management.   Human capital of management might affect whether enterprises export or not. For example, managers with university degrees might be more likely to have contacts abroad—especially if they obtained their degrees outside of their home countries—or might be more willing to overcome bureaucratic barriers to exporting.[28] To test whether this is the case, the regressions include a dummy variable indicating whether the manager has a university degree. In the regressions that treat trade and customs regulations as exogenous and that substitute average customs and trade regulations for enterprises in that sector (see Table 8), the coefficient is positive, but statistically insignificant in most specifications. When trade regulations are treated as endogenous, the coefficient remains positive, but increases

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[26] This is consistent with results for five African countries (including Tanzania and Kenya) presented in Söderbom and Teal (2003).

[27] Lal (2004) shows that Indian firms that use e-business technologies more intensively were more likely to export than other firms were. Using data from manufacturing enterprises in 27 low and middle income countries in Eastern Europe and Central Asia, Clarke (2001) shows that enterprises that were connected to the Internet exported more than other enterprises, even after controlling for self-selectivity bias.

[28] Wood and Jordan (2000) argue that human capital in management—and in particular connections with potential international partners—might partially explains the difference between Uganda and Zimbabwe with respect to exporting.

in size and becomes statistically significant in some regressions (see Table 9). These results, however, are not highly robust.
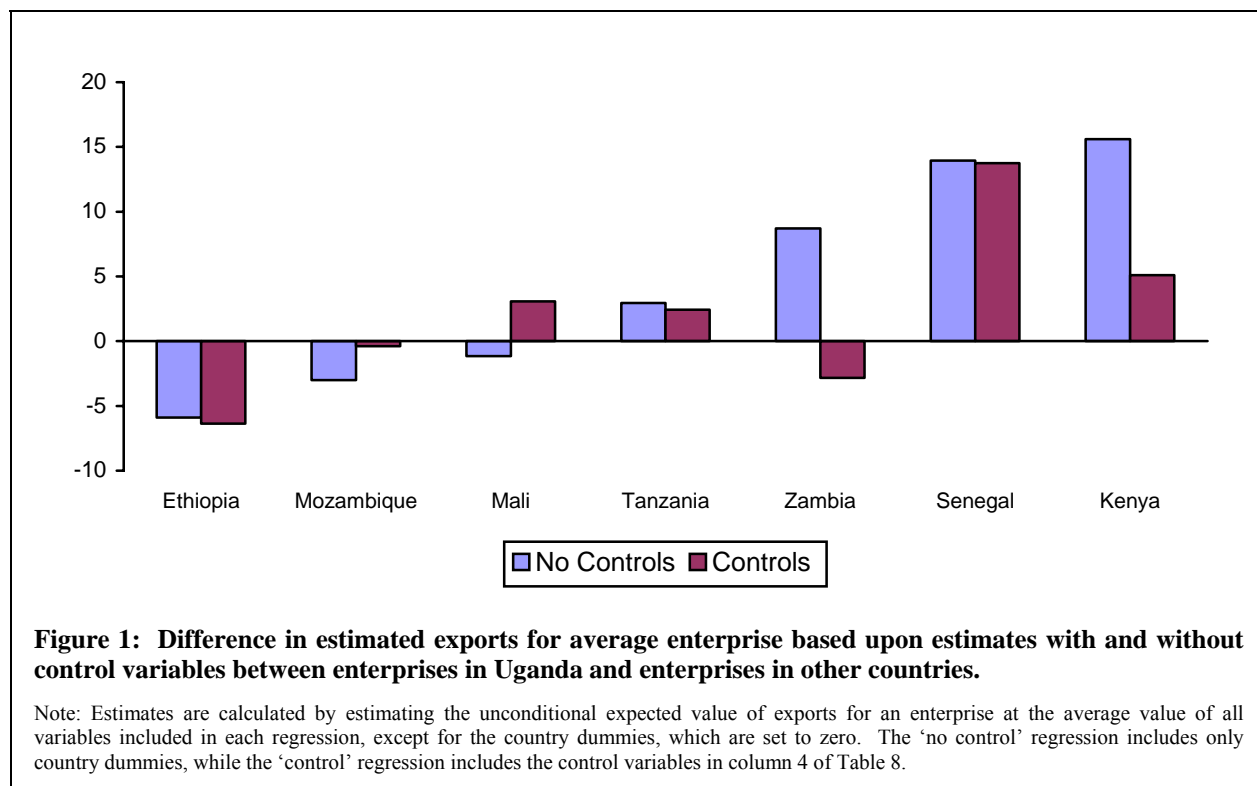
Transportation Infrastructure. In Table 10, an additional variable is added to the base regression—an index variable representing the enterprise manager's perceptions about how great an obstacle transportation is to enterprise operations and growth. When the perceptions variable is included directly in the regression, the coefficient is positive and statistically significant. This suggests that firms that perceive transportation to be a greater problem are more likely to export. Although this result might appear to be counter-intuitive at first glance, it is probably also due to reverse causation. That is, exporters might be more likely to rate transportation as a greater problem than non-exporters because they will generally have to ship products further than non-exporters and, therefore, will be more vulnerable to transportation failures.

For this reason, we re-estimate the regression allowing this variable to be endogenous. As a first exercise, as before, the average rating for enterprises in the same sector and region is substituted for the enterprise's own rating. Since we are primarily interested in domestic transportation infrastructure, the average is taken over all enterprises in the same sector that are not involved in exporting. After doing this, the coefficient on this variable becomes negative, although it remains statistically insignificant (see column 2 of Table 10). The (statistically insignificant) point estimate suggests that a 1-point increase on this index would increase average exports by only about 1.3 percentage points. When the model is re-estimated as an endogenous Tobit model, using average values of the two obstacles as instruments, the coefficient on the transportation index increases in size, but remains statistically insignificant. Hence, the results provide only relatively weak support for the assertion that transportation has a strong negative impact on exporting.

Country Dummies. The coefficients on the country dummies are jointly statistically significant at a 1 percent level or higher whether trade and customs regulations are endogenous or exogenous. In practice, however, results on the main variables of interest are similar whether country dummies are included or excluded (see, for example, columns 3 and 4 of Table 9).

The control variables explain some of the differences between countries in terms of export behavior. In particular, they explain much of the above average performance of firms in

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Zambia and Kenya (see Figure 1). For example, before controlling for the other variables, enterprises in Kenya and Zambia appear to export significantly more of their output than firms in Tanzania. After controlling for the other factors, the differences between Kenya and Tanzania are statistically insignificant and enterprises in Tanzania export more than enterprises in Zambia.[29] The difference between Kenya and Uganda is also reduced—although the difference remains statistically significant.

Figure 1: Difference in estimated exports for average enterprise based upon estimates with and without control variables between enterprises in Uganda and enterprises in other countries.

Note: Estimates are calculated by estimating the unconditional expected value of exports for an enterprise at the average value of all variables included in each regression, except for the country dummies, which are set to zero. The 'no control' regression includes only country dummies, while the 'control' regression includes the control variables in column 4 of Table 8.

In general, after controlling for the other factors, enterprises in land-locked countries (e.g., Uganda and Zambia) tend to export less than enterprises in countries that are not land-locked (e.g., Kenya and Senegal). Although this might seem surprising given that most exports are to neighboring countries, it is important to note that distant markets remain somewhat important for most countries. Two exceptions to this general pattern are Mali, where enterprises

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[29] This is true whether average trade and customs regulations are included directly (e.g., in Column 4 of Table 8) or whether trade and customs regulations are treated as endogenous (e.g., in Column 4 of Table 9).

export more on average than enterprises in some non-landlocked countries and Mozambique, where enterprises export less on average than enterprises in some landlocked countries.

IV.   CONCLUSION

Recently, there has been much concern about Africa's export performance. Africa's share of world exports has declined in recent decades and most countries in Africa are highly dependent upon a narrow range of primary commodities for their export earnings. The poor performance of manufacturing exports has been a particular concern—especially given recent evidence that exporting improves productivity (Bigsten *et al.,* 2004; Mengistae and Pattillo, 2004).

This paper looks at factors that affect the export performance of African firms in eight countries. Consistent with previous work, large enterprises and foreign-owned enterprises are more likely to export than other enterprises. In addition, state-owned enterprises are less likely to export than privately owned enterprises.

Government policies also affect exporting. One way that governments could improve export performance would be to upgrade communications facilities. This paper suggests that enterprises that have Internet connections are more likely to export than enterprises without. In addition to suggesting the benefits of improving telecommunications infrastructure, this also suggests the benefits associated with reducing regulation. Recent work has shown that regulation has a significant negative impact on Internet access in developing countries (Wallsten, 2003). Although there are some concerns regarding the exogeneity of this variable, it is important to note that the other results are robust to its exclusion.

The empirical results provide only relatively weak support for the assertion that the quality of domestic transportation infrastructure affects export performance. Although the results suggest that exports are lower in regions where domestic transportation is a greater problem, the coefficients on this variable are generally not statistically significant. This, of course, does not mean that transportation costs have no impact—even after controlling for other factors, enterprises in land-locked countries were less likely to export than enterprises in countries with seaport facilities

Finally, restrictive trade and customs regulations appear to discourage exporting. In recent years, many countries, including most of the countries in this study, have reduced tariff and non-tariff barriers to trade. However, other problems remain. For example, customs administration is slow and prone to corruption in many African countries—enterprises in Tanzania reported that on average it takes about 12 days for exports and 19 days for imports to clear customs. In comparison, it takes only 2 and 3 days for exports and imports respectively to clear customs in the Philippines. Steps to improve customs administration could therefore be helpful. For example, reducing physical inspections of goods when appropriate and minimizing contacts between customs administration staff and importers and exporters could reduce both processing times and opportunities for corruption (De Wulf, 2003; De Wulf and Finateu, 2002). In addition, increasing the use of information technology—and improving procedures so that it is used efficiently—can often accelerate customs processing. A recent program in Ghana reduced average processing times from weeks to only a few days (World Bank, 2004c).

Steps to improve other aspects of trade and customs administration and regulation would also be useful. Many firms that imported goods reported that they needed import licenses in the countries in this study. Firms from only one country, Zambia, were asked about special regulations, permits and licenses needed for exporting. The limited evidence from this one country suggests that restrictions on exports are also problematic. Finally, programs to encourage exports, such as duty drawback schemes, are often poorly administered with long delays for payments and refunds.

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VI.   TABLES

Table 1: Manufacturing exports and value-added in 2002 (as % of GDP)

	Manufacturing Value-Added (% of GDP)	Manufacturing Exports (% of GDP)
Average Africa	**10.6**	**3.3**
Ethiopia		1.0
Kenya	13.0	4.1
Mali	3.0	
Mozambique*	15.3	1.5
Senegal	13.8	10.8
Tanzania*	7.4	1.4
Uganda	10.2	0.6
Zambia	11.6	3.6
Average Asia	**24.6**	**17.9**
China	35.4	23.1
India	15.6	7.3
Philippines	22.8	23.3

Note: Column 1 is value-added in the manufacturing sector, while column 2 is the fob value of manufacturing exports. Data for Tanzania and Mozambique is for 2001
Source: World Bank (2004b) *World Development Indicators*.

Table 2: Enterprises in Investment Climate Samples that Export

	% of Enterprises Exporting	**Share of Output Exported**
Average Africa	**28%**	**11.8**
Ethiopia	7%	3.7
Mali	19%	7.1
Mozambique	12%	7.6
Uganda	19%	9.6
Tanzania	26%	11.7
Zambia	40%	14.6
Kenya	58%	17.8
Senegal	43%	22.0
Average Asia	**35%**	**21.6**
China	52%	26.0
India	22%	12.6
Philippines	31%	26.0

Table 3: Export destinations for enterprises included in the Investment Climate Surveys.

	Most Important Export Destinations (% of exporters that report destination is important)	Most important industrialized export destination
Ethiopia	Italy (55%), United Kingdom (29%), Germany (19%)	Italy (55%)
Kenya	Uganda (74%), Tanzania (61%), Rwanda (19%)	United Kingdom (8%)
Mali	Burkina Faso (63%), Guinea (53%), Niger (38%)	France (9%)
Senegal	Gambia (39%), Mali (36%), Mauritania (31%)	France (18%)
Tanzania	Kenya (38%), Malawi (14%), Uganda (12%), United Kingdom(12%), Zambia (12%)	United Kingdom (12%)
Uganda	Rwanda (49%), Congo (33%), Kenya (18%)	United Kingdom (16%)
Zambia	Congo (38%), Malawi (22%), Germany (21%)	Germany (21%)

Source: Investment Climate Surveys.
Note: Enterprises were asked to list their three most important export destinations. Countries are ranked based upon the number of enterprises that ranked each country among the top three. Not all enterprises reported three destinations. Data were not available for Mozambique.

Table 4: Average tariff rates in the mid-1990s and early 2000s.

	Capital goods		Intermediate goods		Total Trade	
	Mid-90s	Early 00s	Mid-90s	Early 00s	Mid-90s	Early 00s
Africa						
Ethiopia	14.9	11.8	11.9	11.0	18.2	13.5
Kenya	24.1	10.0	22.3	8.3	21.0	13.3
Mali	6.1	7.9	5.3	12.6	10.3	10.6
Mozambique	8.0	7.7	12.9	7.6	17.4	10.2
Senegal	---	7.7	---	10.4	---	10.5
Tanzania	9.8	6.4	20.9	6.5	15.6	8.6
Uganda	12.6	3.4	17.3	6.3	16.8	6.7
Zambia	20.4	10.5	18.2	6.0	17.9	10.8
Asia						
China	26.0	8.7	32.5	9.3	39.2	11.4
India	51.5	26.5	62.0	32.7	58.5	32.2
Philippines	13.4	2.6	18.5	3.8	23.0	4.6

Source: UNCTAD TRAINS database.
Note: Average tariff rates are weighted averages rates. Years for data are: Ethiopia (1995, 2002); Kenya (1994, 2001); Mali (1995, 2003); Mozambique (1997, 2003); Senegal (1993, 2003); Tanzania (1993, 2003); Uganda (1994, 2003); Zambia (1993, 2003); China (1993, 2003); India (1992, 2001) and Philippines (1993, 2003).

Table 5: Customs and trade regulations and days for exports and imports to clear customs.

	% of enterprises reporting trade and customs regulations are a major or very severe problems		Days for exports and imports to clear customs (average)	
	Exporters	**Non-Exporters**	**Exports**	**Imports**
Africa	**40.1%**	**32.6%**	**6.1**	**9.9**
Ethiopia	44.0%	34.9%	5.6	14.7
Kenya	47.0%	39.1%	4.5	9.6
Mali	28.0%	17.1%	5.4	8.5
Mozambique	55.6%	47.4%	9.4	10.8
Senegal	37.9%	35.4%	6.4	7.3
Tanzania	41.2%	26.6%	11.7	18.5
Uganda	36.4%	24.1%	3.5	5.1
Zambia	30.7%	36.3%	2.2	4.8
Asia	**27.9%**	**11.7%**	**3.8**	**5.4**
China	32.3%	9.6%	5.4	7.5
India	16.9%	11.5%		
Philippines	34.6%	13.9%	2.3	3.3

Source: Investment Climate Surveys.

Table 6: Clearing agents, import licenses and duty drawback schemes

	Clearing Agents	Import Licenses and Permits			Duty Drawback Schemes	
	% of importers that use agents	% of importers that need license	Average days to get license	% that report informal payments	% of exporters that use schemes	Delays in getting refunds
Ethiopia	---	---	---	---	37%	74
Kenya	96%	58%	7	3%	10%	---
Mali	90%	60%	5	10%	35%	---
Mozambique	98%	---	---	---	6%	---
Senegal	91%	31%	13	14%	49%	---
Tanzania	85%	27%	16	16%	19%	---
Uganda	89%	28%	6	6%	31%	---
Zambia	93%	23%	10	---	56%	93

Source: Investment Climate Surveys.

Table 7: Variable means by country

		Ethiopia	Kenya	Mali	Mozambique	Senegal	Tanzania	Uganda	Zambia
Observations		**182**	**198**	**100**	**58**	**200**	**161**	**232**	**155**
Obstacle due to transportation	(higher mean greater obstacle)	1.03	1.96	1.25	1.54	1.70	1.51	1.44	1.68
Workers	(number)	174	230	50	116	135	118	145	246
Age of establishment	(years)	15	21	9	19	11	11	1	15
Majority government owned	(percent of enterprises)	18.7%	2.0%	10.0%	0.0%	3.0%	3.7%	2.1%	1.9%
Majority foreign owned	(percent of enterprises)	6.0%	16.2%	14.0%	17.2%	19.5%	19.9%	25.6%	24.5%
Enterprise uses internet	(percent of enterprises)	60.4%	80.3%	41.0%	69.0%	61.5%	65.2%	42.7%	83.9%
Enterprise manager has university education	(percent of enterprises)	61.0%	62.1%	34.0%	24.1%	47.5%	70.8%	41.5%	89.7%

Table 8: Effect of trade regulation and enterprise characteristics on manufacturing exports—Tobit

	(1)	(2)	(3)	(4)
	Exports as percent of sales in 2001/02			
Sector Dummies	Yes	Yes	Yes	Yes
Country Dummies	No	Yes	No	Yes
Observations	1501	1501	1288	1288
Customs and trade regulations	1.37	0.57		
(index - higher values mean greater obstacle)	(0.87)	(0.37)		
Average customs and trade regulations [a]			-7.28**	-8.05***
(index - higher values mean greater obstacle)			(2.56)	(2.64)
Workers	16.20***	15.81***	15.50***	15.63***
(natural log)	(8.75)	(8.61)	(8.39)	(8.54)
Age of establishment	2.23	1.72	1.74	1.19
(natural log)	(0.95)	(0.73)	(0.73)	(0.50)
Majority government owned	-54.16***	-35.61***	-51.64***	-34.26***
(dummy)	(4.83)	(3.15)	(4.62)	(3.03)
Majority foreign owned	13.98**	11.03**	13.14**	11.65**
(dummy)	(2.57)	(2.05)	(2.42)	(2.16)
Enterprise uses internet	42.96***	45.82***	43.99***	45.83***
(dummy)	(7.16)	(7.64)	(7.40)	(7.74)
Enterprise manager has university education	2.65	8.15	3.67	9.08*
(dummy)	(0.53)	(1.59)	(0.74)	(1.77)
Constant	-138.19***	-115.23***	-106.86***	-90.06***
	(4.59)	(3.92)	(3.52)	(3.00)
Pseudo R-Squared	0.08	0.09	0.06	0.08

Note: T-stats in parentheses. * Significant at 10% level ** Significant at 5% level *** Significant at 1% level. Sectors are Agro-industry; Chemicals; Construction Materials; Wood, Wood Products and Furniture; Metals; Machinery; Paper, Printing and Publishing; Plastics; and Textiles, Leather and Garments). Countries are Ethiopia, Kenya, Mali, Mozambique Senegal, Tanzania, Uganda, and Zambia.
[a] Average ranking of customs and trade regulations for exporters in that region and sector.

Table 9

Effect of trade regulation and enterprise characteristics on manufacturing exports- Endogenous Tobit

	(1)	(2)	(3)	(4)
	Exports as percent of sales in 2001/02			
Sector Dummies	Yes	Yes	Yes	Yes
Country Dummies	No	Yes	No	Yes
Instruments	Average Obstacle [b]	Average Obstacle [b]	Customs Delays [c]	Customs Delays [c]
Observations	1166	1166	1463	1463
Customs and trade regulations [a]	-25.01**	-28.42**	-149.39**	-83.41**
(index - higher values mean greater obstacle)	(2.55)	(2.53)	(2.36)	(2.11)
Workers	15.28***	15.67***	19.06***	16.85***
(natural log)	(7.51)	(7.56)	(3.73)	(5.06)
Age of establishment	-0.19	-0.86	-0.92	-0.95
(natural log)	(0.07)	(0.31)	(0.14)	(0.22)
Majority government owned	-52.68***	-37.41***	-64.35**	-40.87**
(dummy)	(4.32)	(2.97)	(2.35)	(2.19)
Majority foreign owned	15.21**	13.78**	38.27**	25.72**
(dummy)	(2.47)	(2.15)	(2.00)	(2.05)
Enterprise uses internet	55.15***	60.09***	133.81***	93.71***
(dummy)	(6.20)	(6.44)	(3.24)	(3.78)
Enterprise manager has university education	7.59	15.77**	24.70	26.31**
(dummy)	(1.29)	(2.40)	(1.51)	(2.13)
Constant	-67.93*	-71.05*	171.53	33.91
	(1.78)	(1.75)	(1.09)	(0.34)

Note: T-stats in parentheses. * Significant at 10% level ** Significant at 5% level *** Significant at 1% level. Sectors are Agro-industry; Chemicals; Construction Materials; Wood, Wood Products and Furniture; Metals; Machinery; Paper, Printing and Publishing; Plastics; and Textiles, Leather and Garments). Countries are Ethiopia, Kenya, Mali, Mozambique Senegal, Tanzania, Uganda, and Zambia.
[a] Treated as endogenous. [b] Average ranking of customs and trade regulations for exporters in that region and sector. [c] Average and maximum delays for average exporters and importers in the same region and sector as the enterprise.

Table 10: Effect of transportation infrastructure on manufacturing exports

	(2)	(4)	(6)
Estimation Method	Tobit	Tobit	Endogenous Tobit
	Exports as percent of sales in 2001/02		
Sector Dummies	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes
Observations	1489	1251	1118
Instruments	---	---	Average Obstacle [b]
Customs and trade regulation [a]	-0.02		-23.0694*
(index - higher values mean greater obstacle)	(0.01)		(1.70)
Transportation [a]	2.86*		-10.3377
(index - higher values mean greater obstacle)	(1.71)		(0.89)
Average customs and trade regulation		-6.08*	
(index - higher values mean greater obstacle)		(1.88)	
Average transportation		-5.28	
(index - higher values mean greater obstacle)		(1.05)	
Workers	15.44***	15.87***	16.8394***
(natural log)	(8.40)	(8.33)	(7.07)
Age of establishment	1.45	0.73	-1.9339
(natural log)	(0.61)	(0.30)	(0.66)
Majority government owned	-36.75***	-32.94***	-35.7019***
(dummy)	(3.25)	(2.83)	(2.71)
Majority foreign owned	10.90**	11.82**	11.2368*
(dummy)	(2.02)	(2.10)	(1.66)
Enterprise uses internet	45.10***	46.03***	60.4185***
(dummy)	(7.55)	(7.51)	(5.75)
Enterprise manager has university education	8.97*	12.92**	21.9240***
(dummy)	(1.74)	(2.40)	(2.98)
Constant	-117.57***	-90.72**	-73.4957
	(4.01)	(2.22)	(1.36)
Pseudo R-Squared	0.09	0.08	---

Note: T-stats in parentheses. * Significant at 10% level   ** Significant at 5% level *** Significant at 1% level. Sectors are Agro-industry; Chemicals; Construction Materials; Wood, Wood Products and Furniture; Metals; Machinery; Paper, Printing and Publishing; Plastics; and Textiles, Leather and Garments). Countries are Ethiopia, Kenya, Mali, Mozambique Senegal, Tanzania, Uganda, and Zambia.
[a] Treated as endogenous. [b] Average ranking of customs and trade regulations for exporters and transportation infrastructure for non-exporters in that region and sector.