RESEARCH ARTICLE

Exporters in Africa: What Role for Trade Costs?

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Abstract

This paper investigates the role of trade costs for exporter dynamics in Africa. In comparison to exporters from other regions, African exporting firms are fewer, smaller, and relatively less diversified in terms of products and destinations. African countries also display the highest rates of entry, exit, and turnover of exporting firms, exporting products, and export destinations. This suggests that Africa's exporting activity is volatile and subject to much experimentation, with exporters facing difficulties maintaining trade relationships. The analysis also confirms that trade costs are a crucial factor in explaining exporter performance in Africa vis-à-vis other regions, but also among African countries. Trade costs play a disproportionate role in affecting the size of new exporters and the survival of exporters in Africa. Also, trade cost differences across African countries are a relevant factor in explaining the lower market diversification of exporters from landlocked countries. A key implication is that the African Continental Free Trade Area can bring many benefits in terms of export flows and destination markets. Yet, without strengthening productive capacities, the diversification of export products will likely remain limited.

Keywords Trade costs · Exporter dynamics · Africa

JEL Classification F14

Abbreviations

AfCFTA	African Continental Free Trade Area
ECI	Economic complexity index
ECOWAS	Economic Community of West African States
GDP	Gross domestic product
GLM	Generalized linear model
HS	Harmonized System
OLS	Ordinary least squares

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1 Introduction

Exports are a major driver of growth fluctuations and development trajectories, significantly shaping the evolution of living standards over time. In the short term, exports are a major source of foreign exchange that encourage economic activity and reduce balance-of-payment constraints. In the medium term, the diversification of exports leads to higher and more sustainable growth rates (Hausmann et al., 2007; Hesse, 2008). In addition, exports are a crucial source of productivity growth through the accumulation of technological capabilities and "learning by exporting" (De Loecker, 2013; Cimoli et al., 2009). In fact, the efficiency gains for less productive firms associated with "learning by exporting" seem relevant in developing countries, where exporters are further away from the technological frontier.

A critical aspect that shapes the performance and competitiveness of exports is trade costs. Trade costs are shaped by multiple economic policies, including tariffs, tariff equivalents of quotas, and trade barriers, but also by connectivity, logistics, regulations, and cultural and historical aspects. Elevated trade costs restrain comparative advantages by making exports uncompetitive, limiting access to technology and intermediate inputs, preventing participation in global value chains, and making diversification more difficult. In addition, changes to trade costs can influence trade, investment, and innovation decisions at the firm level, with effects on productivity as well.[1] In brief, as emphasized by Anderson and Wincoop (2004), "the death of distance is exaggerated…trade costs are large, even aside from trade-policy barriers and even among highly integrated economies".

Trade costs are relatively high in Africa, in comparison not only to developed countries but also to other developing countries (Arvis et al., 2016; Porteous, 2019; World Bank, 2015). The lack of transport infrastructure, inefficient law enforcement and related property rights institutions, poor business services and logistics, and deficient regulations are particularly acute. In some cases, trade costs between neighboring African countries are extremely high. In fact, it is often cheaper for African exporters to trade with developed countries that are far away, rather than with neighboring economies. Currently, Africa is undergoing a massive trade integration initiative, called the African Continental Free Trade Area (AfCFTA).[2] Once it is fully implemented, 90% of goods tariff lines between countries will have zero duty. Under the AfCFTA, the rules of origin will play a crucial role in fostering the nexus between trade, industrialization, and the emergence of regional value chains (UNCTAD, 2019).

The literature on trade costs in Africa has made considerable progress. Geda and Seid (2015) show that there is immense potential for the expansion of trade within Africa, but this is constrained by high trade costs and a lack of productive capacities. Likewise, Hoekman and Shepherd (2015) and Hoekstra (2013) highlight that trade facilitation measures can improve African exporters' participation in global value chains. Seck (2016) stresses that improving customs clearance and energy and telecommunication infrastructure increases the likelihood of African firms entering into foreign markets and the extent of their trading activity. The results from that paper also suggest that African firms tend to

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[1] Lower trade costs due to lower tariffs can generate changes in firm productivity and induce magnifying effects on trade flows through firm decisions on export and import products and markets (Bernard et al., 2018). Dennis and Shepherd (2011) suggest that a 10% reduction in trade costs could lead to a 3–4% increase in the number of export products, promoting diversification.

[2] Despite the proliferation of Africa's regional economic communities, trade integration remains low. The share of intra-African exports is less than 20%, substantially lower than in Europe (68%) and Asia (59%).

respond more strongly to changes in trade costs, due to the greater constraints they face. Brenton et al. (2012) find that the low survival of African firms in export markets is largely explained by high trade costs. Using commodity-level data, Nkansah et al. (2022) show that the Economic Community of West African States (ECOWAS) increased the survival rate of Ghana's exports. Finally, Iwanow and Kirkpatrick (2009) and Clarke (2005) show that the performance of exporters is limited by poor infrastructure and unfriendly regulations, particularly inefficient customs administration.

In this paper, we first describe aggregate characteristics regarding exporter dynamics in African countries, including the number and size of exporters and the patterns of entry, exit, and survival of exporters, export products, and export destinations. Then, we investigate how trade costs affect the size and survival of exporting firms in Africa vis-à-vis other regions. From a theoretical standpoint, lower trade costs can facilitate the emergence, survival, and expansion of new exporters. For example, theoretical and empirical contributions from the "new" new trade theory have emphasized that when trade costs fall, fewer productive exporters exit and more productive exporters expand, a process that promotes aggregate productivity growth (Melitz, 2003). Finally, we examine whether differences in trade costs among African countries are systematically related to diversification.

The rest of this paper is organized as follows. Section 2 describes the data used for the empirical analysis. Section 3 describes the characteristics of exporter dynamics in Africa. Section 4 presents an empirical approach to econometric analysis, and Sect. 5 discusses the main results. Section 6 provides concluding remarks.

2 Data

The statistical information comes from the *Exporter Dynamics Database*.[3] This database compiles firm-level merchandise export information from national customs agencies, covering the universe of all exporter transactions. It contains information for 40 developing countries and 10 developed countries between 1997 and 2014. The sample includes 15 African countries: Botswana, Cameroon, Ethiopia, Gabon, Guinea, Kenya, Madagascar, Malawi, Mali, Mauritius, Morocco, Senegal, South Africa, Uganda, and Zambia. Two levels of disaggregation were used in this analysis: the country–year level and the country–year–sector level. Sectoral-level information was used at the two-digit level of the Harmonized System (HS) 2002 Classification for 95 sectors, excluding oil sector exports. The database contains information at country and sectoral levels regarding: (i) the number of exporters and average exporter size in export value; (ii) export diversification (the average number of products and destinations per exporter); (iii) firm dynamics (exporter entry, exit, and first-, second-, and third-year entrants (new exporters in year *t*), and survival rates); (iv) firm–product dynamics (product entry, exit, and survival rates for incumbent exporters); and (v) firm–destination dynamics (destination entry, exit, and survival rates for incumbent exporters).

Our proxy for trade costs comes from the ESCAP-World Bank Trade Cost database.[4] This trade cost measure, based on Novy (2012), describes average bilateral trade costs by country and year. It captures all the additional costs involved in trading goods bilaterally relative to those involved in trading goods domestically, in ad valorem equivalent form.
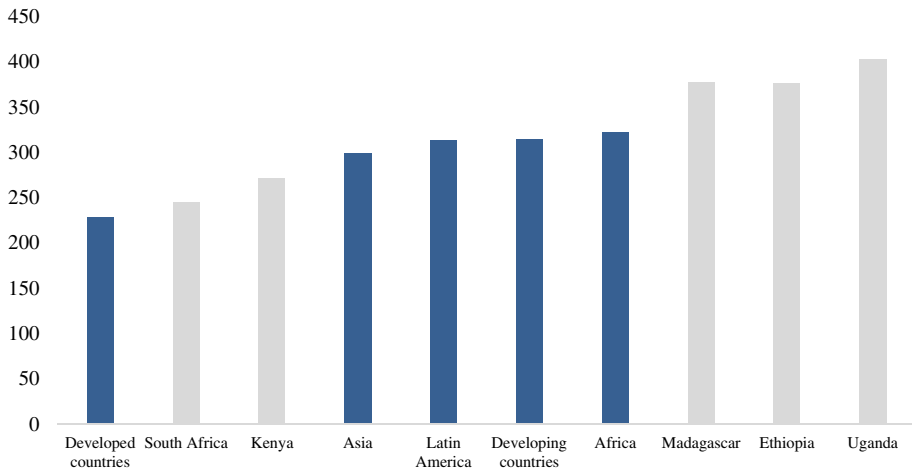

Fig. 1 Average trade costs, 2010–2012. Source: Authors' calculations based on data from ESCAP-World Bank Trade Cost database. The data cover 44 countries

Thus, it comprises a diverse set of trade costs, including international shipping and logistics costs, tariff and non-tariff costs (indirect and direct costs associated with trade procedures and regulations), and even additional costs from differences in language, culture, or currency.[5]

Though trade costs have declined over time, developing countries continue to exhibit higher trade costs than developed countries, with African countries displaying the highest levels (Fig. 1). Yet, there is some heterogeneity as well. South Africa and Kenya display lower trade costs than the average Asian countries or the average Latin American countries in our sample, with levels comparable to even European countries. On the contrary, Ethiopia, Madagascar, and Uganda exhibit among the highest trade costs.

3 African Exporter Dynamics

Exporter dynamics in Africa exhibit some well-defined characteristics in comparison to the rest of the world. African exporters are fewer, smaller, and relatively less diversified (Table 1). African countries display the lowest average number of exporting firms. They also display the smallest size of exporting firms and size of new exporters. In addition, export products per firm are few, with an average of only 6.1, in comparison to 8.3 export products in developed countries. Furthermore, excluding South Africa, African export products average just 5.5 per exporter. African countries also exhibit the lowest number of destinations per exporter. These findings are not unexpected, and they can be largely attributed to the size of the countries and their level of development and technological capabilities (Vergara, 2021).

African countries display higher rates of entry and exit of exporting firms. This high turnover means that many firms in Africa begin exporting frequently but stop shortly afterwards. In Guinea, Malawi, and Uganda, between 2010 and 2012, over half of

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[5] See Annex A1 for a formal definition.

Table 1 Characteristics of African exporter firms, 2010–2012. Source: Authors' calculations based on data from the *Exporter Dynamics Database*

	Africa	Other developing countries	Developed countries
Average number of exporters	3679	8983	22,460
Export value per exporter	$2.1 M	$3.4 M	$4.3 M
Export value per new exporter	$240,091	$293,927	$380,579
Export products per exporter	6.1	5.5	8.3
Export destinations per exporter	2.4	3.0	3.9

'Other developing' refers to all developing countries in the sample apart from African countries
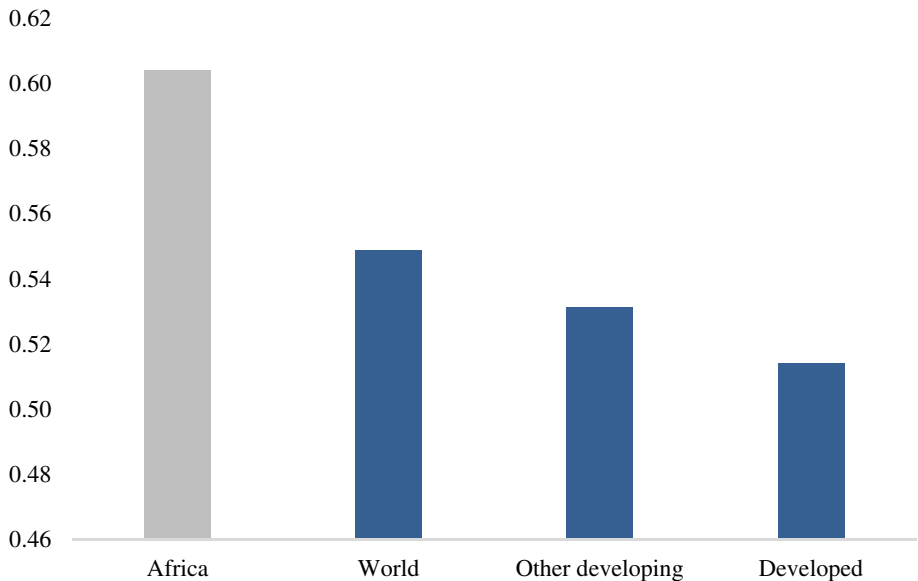
Fig. 2 Average destination turnover rate. Source: Authors' calculations based on the *Exporter Dynamics Database*. The turnover rate is the sum of entry and exit rates. 'Other developing' refers to all developing countries in the sample apart from African countries

exporting firms did not export during the previous year, either because they were first-time exporters or because they had returned to exporting activity after at least a year of inactivity. In developed countries, just over one-third were in the same situation. African countries also exhibit higher rates of entry and exit of exporting products. In Botswana, between 2010 and 2012, over 70% of exported products among incumbents (i.e., firms who exported in the year prior to the analysis) had not been exported the year prior. At the same time, over 70% of products that were exported the year prior were not exported the following year. This contrasts with rates of only about 40% of products in developed countries for both the former and latter. In addition, entry and exit (turnover) of export destinations is also higher in Africa (Fig. 2).

African countries also exhibit the lowest survival rate of exporting firms, amid relatively high entry rates and a very low number of firms exporting for more than one year. The

average first-year survival rate for entrants is particularly low for African countries, excluding South Africa. In Cameroon, Guinea, and Malawi, less than 30% of firms continue exporting after their first year, in comparison to 41% in developed countries. This pattern is similar for longer time spans. The same behavior is observed among African firms regarding the survival of export products. In Botswana, Kenya, Malawi, Senegal, South Africa, and Zambia, less than a quarter of their export products continue being exported after one year, compared to 31% in developed countries.

These patterns indicate that African exporting activity across firms, products, and destinations is dynamic and volatile. There seems to be a lot of experimentation, as firms easily become exporters and non-exporters and continually change and adjust their export products and export destinations. Furthermore, African exporters seem face difficulties maintaining trade relationships.

4 Empirical Approach

From a theoretical viewpoint, a reduction in trade costs can encourage the expansion and survival of exporters (Brenton et al., 2012; Melitz, 2003). To empirically investigate the effect of trade costs on the size and survival of exporters, we follow the approach proposed by Fernandes et al. (2016) and specify the following equations:

$$\text{Size}_{ijt} = \alpha_i + \delta_t + \theta \text{TradeCosts}_{jt} + \gamma \text{Tradecosts}_{jt} * \text{Africa}_j + \beta X_{jt} + \varepsilon_{ijt}, \tag{1}$$

$$\text{Survival}_{ijt} = \alpha_i + \delta_t + \rho \text{Size}_{ijt} + \theta \text{TradeCosts}_{jt} + \gamma \text{Tradecosts}_{jt} * \text{Africa}_j + \beta X_{jt} + \varepsilon_{ijt}, \tag{2}$$

where i, j, and t represent the sector, country, and year, respectively. Equations (1) and (2) provide a suitable and pragmatic empirical approach to analyze the role of country-level characteristics (e.g., trade costs) on the size and survival of exporters.[6] In Eq. (1), the dependent variable *Size* is the log of the average exports per exporter and the log of the average exports per entrant at the sectoral level. In Eq. (2), the dependent variable *Survival* is the 1- and 3-year (average) survival rate of new exporters in foreign markets. As discussed, the *Trade costs* variable describes average bilateral trade costs by country and year (Novy, 2012). To test for the specific effects of trade costs for Africa in comparison to other regions, we include a multiplicative variable between *Trade costs* and *Africa*, a dummy variable that takes the value 1 for African countries, and 0 otherwise.

The vector X encompasses several control variables that have been identified as playing a potentially relevant role in exporter dynamics across countries: *GDP* is the log of GDP in constant US dollars, and *GDP per capita* is the log of GDP per capita in constant US dollars. *Trade over GDP* denotes the total merchandise exports and imports over GDP. *Financial sector* is an index of financial development that summarizes information regarding financial depth, access, and efficiency (Sahay et al., 2015). The development of the financial sector can be a relevant factor in explaining the performance of exporters in

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[6] This approach allows us to investigate the correlation of country-level variables, such as trade costs, with the size and survival of exporters, which are variables defined at the sectoral level in our dataset. Using the same database, Fernandes et al. (2016) analyze the effects of country size and level of development on the number, size, and concentration of exporters in developing countries. Their empirical results suggest that larger and more developed countries tend to have more and larger exporters, and a greater share of exports controlled by the top 5%.

foreign markets, as it can facilitate large-scale investments and high-return projects that can allow firms to initiate or expand export activities (Beck, 2002).

The *Exchange rate* is an index that measures the fluctuations of the real effective exchange rate, a major factor that affects the profitability of exporters (Berman et al., 2012). *Commodity-dependent* is a dummy variable that takes the value 1 for commodity-dependent countries. In the case of survival, we also include the size of exporters as an additional control variable. Finally, α_i and δ_t correspond to sectoral and year effects, respectively. Following Fernandes et al. (2016), Eq. (1) is estimated by ordinary least squares (OLS). Equation (2) is estimated with a generalized linear model (GLM) using a logit link function, given that the dependent variable (survival rate) ranges between 0 and 1 (Papke & Wooldridge, 1996).[7]

To investigate whether differences in trade costs across African countries are correlated with differences in diversification, we specify the following equation:

$$
\begin{aligned}
\text{Diversification}_{ijt} = {} & \alpha_i + \delta_t + \rho \text{Size}_{ijt} + \theta \text{TradeCosts}_{jt} + \gamma \text{Tradecosts}_{jt} \\
& * \text{Landlocked}_j + \varphi \text{ProductiveCapacities} + \beta X_{jt} + \varepsilon_{ijt},
\end{aligned}
\tag{3}
$$

where *i*, *j*, and *t* represent the sector, country, and year, respectively. The dependent variables are the (i) *Products per exporter* (log of the average number of products per exporter – products defined at six digits of the HS 2002 Classification); and (ii) *Destinations per exporter* (log of the average number of destination countries per exporter). In order to analyze the role of trade costs, we include the variable *Trade costs* and the multiplicative variable between *Trade costs* and a dummy that takes the value 1 for landlocked countries. Landlocked African countries could be relatively more affected by higher trade costs. There is ample evidence showing that landlocked economies are affected by the high cost of freight services and unpredictability in transportation time, owing to physical constraints, rent-seeking activities, and severe flaws in transit systems (Arvis et al., 2010). In our sample, there are six landlocked economies: Botswana, Ethiopia, Malawi, Mali, Uganda, and Zambia. As expected, these countries display higher trade costs, and it could be argued that being landlocked disproportionally affects trade in these economies (World Bank, 2014).

In addition, a proxy for productive capacity is included, as this plays a crucial role in export diversification (Hausmann et al., 2011). We use the economic complexity index (ECI) as a proxy for productive capacity. The ECI measures the multiplicity of productive knowledge in an economy by combining information on the diversity of a country's exports and the ubiquity of its products. While including a variable that is built upon product diversification can generate estimation doubts in Eq. (3) when using product diversification as a dependent variable, we believe this is not problematic. First, the ECI measures the "stock of productive knowledge" at the country level, while product diversification (i.e., the average number of exported products per exporter) is defined at the sectoral level. Second, as discussed by Mealy et al. (2018) and Kemp-Benedict (2014), the ECI seems to be orthogonal to diversity, and it captures information on what types of products and capabilities countries are competitive in. The vector X encompasses a set of control variables: *GDP*, *GDP per capita*, *Trade over GDP*, *Financial sector*, and *Exchange rate*. As with Eq. (1), Eq.(3) is estimated by OLS.

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[7] For a broader discussion of estimation procedures when the dependent variable is a proportion between 0 and 1, see Baum (2008).

5 Econometric Results

Table 2 presents the results on how trade costs correlate with the size of exporters. Columns 1, 3, and 5 provide the baseline estimations with the control variables, while columns 2, 4, and 6 display the regressions, including the trade cost variable. For all exporters, the coefficient associated to the *Trade costs* is not significant. In addition, there seems to be no specific effect related to countries in Africa. However, the size of the economies and how open they are to international trade are relevant dimensions to explain the size of exporters.

The subsequent regressions show that trade costs are actually a relevant dimension to explain the size of new exporters and surviving new exporters. The coefficients are negative and significant, as shown in columns 4 and 6. Thus, sectors from countries that face higher trade costs tend to have smaller exporters. On average and across sectors, new exporters and surviving new exporters from a country with trade costs that are 20% lower are about 12% and 17% larger, respectively, than their counterparts from the other country.

The multiplicative variable of trade costs and the dummy for Africa is significant at 5% for the sample of new exporters and surviving new exporters. This suggests that trade costs play a disproportionate role in affecting the size of new exporters and new surviving exporters in Africa in comparison to exporters from other regions. A decline in trade costs of 20% in an African country—which in the middle of the distribution implies a change in the trade costs of a country in the 25th percentile to the value of a country in the 75th percentile—is associated with an increase in the size of new exporters and new surviving exporters of 14% and 19%, respectively. These results should be taken with caution, as the empirical framework prevents strong inferences on causality. Also, the response of a reduction in trade costs would be heterogeneous across sectors.

Similar to the case of all exporters, differences in the size of the economies and in trade openness are significantly and positively correlated with differences in the size of new exporters. The development of the financial sector is also a relevant dimension. Sectors from countries with more developed financial sectors tend to have smaller exporters. Intuitively, the development of the financial sector can motivate smaller firms to become exporters.

Table 3 displays the results on the survival of exporters. Trade costs do not seem to be a relevant factor in explaining survival differences. Yet, trade costs do play a role for the specific case of Africa, as the multiplicative variable is negative and significant for the 1- and 3-year survival regressions. Thus, in the comparison across sectors, exporters from Africa display lower rates of survival in foreign markets vis-à-vis other regions. A decline in trade costs of 20% is associated with an increase in the 1-year and 3-year survival probability for new exporting firms of 0.5% and 0.8%, respectively. While these numbers might seem small, it is worth emphasizing that trade costs play a relevant role in export survival only in African countries. This is in line with other studies showing how trade integration efforts increased export survival for African firms (Socrates et al., 2020). As expected, the regressions also show that larger exporters are associated to higher survival rates in foreign markets. Furthermore, sectors from countries that are more open to international trade have exporters with higher survival rates. Finally, the exchange rate, a major aspect of the profitability of exporting activity, also plays a role in the survival of exporters.

Table 4 displays the results regarding trade costs and diversification among African countries. The size of exporters is a crucial aspect explaining diversification, even within a sample of African countries. Larger exporters in Africa tend to be more diversified. The results also show that differences in trade costs are not correlated with differences in

Table 2 Trade costs and size of exporters

	All exporters (1)	All exporters (2)	New exporters (3)	New exporters (4)	Surviving new exporters (5)	Surviving new exporters (6)
GDP	0.599 (6.86)***	0.479 (5.59)***	0.515 (7.57)***	0.375 (6.94)***	0.599 (7.14)***	0.417 (6.25)***
GDP per capita	0.110 (1.13)	0.108 (1.39)	−0.151 (2.22)**	−0.161 (3.56)**	−0.162 (2.00)**	−0.170 (3.61)**
Trade over GDP	0.014 (5.69)***	0.110 (3.70)**	0.015 (7.58)***	0.011 (6.19)***	0.016 (6.89)***	0.010 (5.37)***
Financial sector	−0.481 (1.80)*	−0.211 (−0.80)	−0.810 (4.06)***	−0.567 (2.85)**	−0.963 (4.77)***	−0.634 (3.89)***
Commodity-dependent	0.374 (2.42)**	0.294 (1.95)*	0.056 (0.43)	−0.058 (0.53)	−0.009 (0.07)	−0.138 (1.47)
Trade costs		−0.552 (1.11)		−0.633 (1.94)*		−0.862 (2.24)**
Trade costs* Africa		−0.509 (1.38)		−0.060 (2.58)**		−0.073 (3.43)**
Sectoral dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.46	0.47	0.37	0.37	0.33	0.34
Number of countries	50	46	49	45	48	44
Observations	33,162	30,309	30,082	27,511	24,046	22,100

The dependent variable is the *Size of exporters*, defined as log of the (mean) exports per exporter at the sectoral level for each category (all exporters, new exporters and sur-viving new exporters). *GDP* is the log of GDP in constant US dollars, and *GDP per capita* is the log of GDP per capita in constant US dollars. *Trade over GDP* is the total merchandise exports and imports over GDP. *Financial sector* is an index of financial development, and *Commodity-dependent* is a dummy variable that takes the value 1 if the country is a commodity-dependent economy. *Trade costs* are the log of the mean of the trade cost variable, and *Africa* is a dummy variable that takes the value 1 for African countries, and zero otherwise. OLS estimations are at the sector level (HS two-digit codes), and t-statistics with robust standard errors are adjusted by clustering at the country level in parentheses. *Significant at 10%. **Significant at 5%. ***Significant at 1%

Table 3 Trade costs and survival of exporters

	1-year survival (1)	1-year survival (2)	3-year survival (3)	3-year survival (4)
Size of exporters	0.085 (11.66)***	0.082 (10.11)***	0.114 (11.22)***	0.112 (9.39)***
GDP	0.030 (1.16)	0.023 (0.82)	0.045 (1.23)	0.029 (0.51)
GDP per capita	0.014 (0.48)	0.000 (0.02)	0.028 (0.63)	0.004 (0.09)
Trade over GDP	0.002 (3.33)**	0.002 (2.83)**	0.003 (3.29)**	0.003 (2.00)**
Financial sector	−0.100 (1.12)	0.012 (0.12)	−0.059 (0.67)	0.093 (0.77)
Commodity-dependent	−0.016 (0.28)	0.013 (0.24)	0.036 (0.45)	0.065 (0.80)
Exchange rate	0.002 (1.66)*	0.002 (1.63)*	0.003 (1.83)**	0.003 (1.72)*
Trade costs		−0.081 (0.35)		−0.160 (0.38)
Trade costs* Africa		−0.026 (2.96)**		−0.043 (3.73)***
Sectoral dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
AIC	0.85	0.85	0.53	0.53
Number of countries	48	44	43	39
Observations	25,848	23,575	17,451	15,833

The dependent variable is the 1-year and 3-year survival rates of new exporters (entrants) per sector. *Size of exporters* is the log of the (mean) exports per exporter. *GDP* is the log of GDP in constant US dollars, and *GDP per capita* is the log of GDP per capita in constant US dollars. *Trade over GDP* is the total merchandise exports and imports over GDP. *Financial sector* is an index of financial development, and *Commodity-dependent* is a dummy variable that takes the value 1 if the country is a commodity-dependent economy. *Exchange rate* is an index that measures the fluctuation of the real effective exchange rate. *Trade costs* are the log of the mean of the trade cost variable, and *Africa* is a dummy variable that takes the value 1 for African countries, and zero otherwise. GLM estimations are at the sector level (HS two-digit codes), and t-statistics with robust standard errors are adjusted by clustering at the country level in parentheses. *Significant at 10%. **Significant at 5%. *** Significant at 1%

product and market diversification. However, trade costs affect landlocked and non-landlocked countries differently. Sectors from landlocked countries in Africa have, on average, exporters that are less diversified in terms of destinations. Thus, trade costs are an important dimension to explain the reduced market diversification in these economies. The size of the coefficient is small, but this is likely due to the distribution of the dependent variable, which is heavily skewed to the left.[8] The negative effect of trade costs is intuitive, as landlocked countries face immense challenges in developing their trade activity.[9]

The regressions also suggest that sectors from countries with more productive capacities tend to have significantly more diversified exporters in terms of products and destinations. The coefficients associated to productive capacities are significant at 5% in both cases. Overall, these results show that while trade liberalization reforms and reduced trade costs can open new markets and encourage trade flows, promoting the diversification of export products will likely remain limited unless productive capacities are strengthened.

[8] In the estimation sample at sectoral level, the average number of destinations per exporter among African countries is only 1.5, with a median of 1.3 and a maximum value of 23.5.

[9] This is reflected in the diversification measures. African exporters from landlocked countries export, on average, less than five products to less than two destinations, while African exporters from non-landlocked countries export about seven different products to more than 2.5 destinations.

Table 4 Trade costs and diversification in Africa

	Destinations per exporter (1)	Destinations per exporter (2)	Products per exporter (3)	Products per exporter (4)
Size of exporters	0.081 (15.03)***	0.081 (15.33)***	0.024 (7.79)***	0.025 (7.01)***
GDP	0.060 (2.13)**	0.018 (0.88)	0.022 (0.74)	0.034 (1.11)
GDP per capita	−0.068 (1.91)*	−0.025 (1.94)*	0.026 (1.05)	0.027 (1.16)
Trade over GDP	0.002 (2.41)**	0.000 (1.58)	0.000 (0.37)	0.000 (0.41)
Financial sector	−0.009 (0.13)	0.013 (0.30)	0.075 (2.07)*	0.086 (2.27)**
Exchange rate	−0.000 (0.24)	−0.000 (1.06)	0.001 (3.08)**	0.001 (3.35)**
Productive capacities	0.090 (1.66)	0.082 (2.66)**	0.123 (3.21)**	0.140 (3.41)**
Trade costs		0.042 (0.44)		0.291 (1.54)
Trade costs* landlocked		−0.016 (2.59)**		−0.007 (1.08)
Sectoral dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
R-squared	0.52	0.54	0.60	0.61
Number of countries	15	14	15	14
Observations	9213	8305	9213	8305

Destinations and *Products per exporter* are the log of the (mean) number of destinations and products per exporter, respectively. *Size of exporters* is the log of the (mean) exports per exporter at the sectoral level. *GDP* is the log of GDP in constant US dollars, and *GDP per capita* is the log of GDP per capita in constant US dollars. *Trade over GDP* is the total merchandise exports and imports over GDP. *Financial sector* is an index of financial development. *Exchange rate* is an index that measures the fluctuation of the real effective exchange rate. *Productive capacities* correspond to the economic complexity index. *Trade costs* are the log of the mean of the trade cost variable, and *Land-locked* is a dummy variable that takes the value 1 for landlocked countries, and zero otherwise. OLS estimations are at the sector level (HS two-digit codes), and t-statistics with robust standard errors are adjusted by clustering at the country level in parentheses. *Significant at 10%. **Significant at 5%. ***Significant at 1%

In order to analyze the sensitivity of the results, several robustness checks were implemented. A key aspect to consider is to what extent the results could be driven by the estimation sample, which is not balanced across countries, and some countries are observed in the database for longer periods of time. To address this issue, we follow a twofold strategy. First, the estimations are implemented on a restricted sample where countries have at least 700 observations. Second, we estimate the equations with a balanced sample containing the same number of observations per country. Thus, the "additional" observations for some countries, in comparison to countries with fewer observations, are left out of the sample. Finally, we use another proxy variable for trade costs, from the World Bank's World Integrated Trade Solutions.[10] This is a country-level variable that measures the official fees associated with completing administrative and transport procedures for exporting or importing goods, in US dollars per container. The robustness checks largely confirm the main results.[11]

6 Concluding Remarks

This paper showed that Africa's exporter dynamics display idiosyncratic features vis-à-vis the rest of the world. African exporters are fewer, smaller, and relatively less diversified than exporters from other regions. This can be largely explained by the smaller size of their economies and their lower level of development. More interestingly, African countries have the highest rates of entry and exit of exporting firms, exporting products, and export destinations. As such, African countries also exhibit the lowest probability of survival of exporting firms, products, and destinations. Therefore, Africa's exporting activity is volatile, with much experimentation, and African exporters face difficulties maintaining trade relationships. While this experimental environment resonates with the Schumpeterian idea of "creative destruction", the case is different here. This environment is more likely associated with structural problems. The reasons behind this could be related to market inefficiencies, profit uncertainties, a lack of information regarding foreign markets, and limited productive capacities.

We also confirmed that trade costs are a crucial dimension in explaining exporter dynamics not only in Africa vis-à-vis other regions but also within African countries. Trade costs play a disproportionate role in affecting the size and survival of new exporters in Africa in comparison to exporters from other regions. Together with the evidence on the size and entry of exporters, this suggests that Africa's exports are more constrained by the size of exporters than by the number of exporters. In addition, we showed that differences in trade costs across African countries are a relevant factor in explaining the lower market diversification of exporters from landlocked countries. The results indicate that productive capacities play a crucial role in product and market diversification among African exporters.

An important implication of this study is that reducing trade costs through the AfCFTA can lead to development benefits in the medium term in terms of export flows and destination markets. Productivity gains might also arise as a result of the expansion of more productive exporters and the exit of less productive ones. Yet, a key message is that, without

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[10] This variable includes the costs for documents, administrative fees for customs clearance and technical control, custom broker fees, terminal handling charges and inland transport (see https://wits.worldbank.org/).

[11] These estimations are available upon request.

strengthening productive capacities, the effects on product diversification and industrial upgrading will remain limited. This is consistent with the long-standing development view that, while trade liberalization can encourage benefits from comparative advantages, such benefits will be insufficient for substantial export diversification and structural change. Thus, there is a need for a much broader, strategic, and targeted set of productive and industrial policies in areas such as infant industries, foreign direct investment, innovation, science and technology, and labor markets, which should be designed according to national development priorities.[12]

Annex A1. Trade Cost Variable—Definition

In line with Novy (2012), the World Bank-ESCAP measure for trade costs calculates the geometric average bilateral trade cost (φ_{ijkt}) between country i and country j in sector k at time t, as the product of country i's intra-national trade (x_{ii}) and country j's intra-national trade (x_{jj}) divided by the product of country i's trade flows to country j, (x_{ij}), and country j's trade flows to country i, (x_{ji}), scaled by a sector-specific elasticity of substitution between sectors:

$$\varphi_{ijkt} = \left(\frac{x_{iikt}x_{jjkt}}{x_{ijkt}x_{jikt}} \right)^{\frac{1}{2(\sigma_k-1)}} - 1$$

Following this approach, the ad valorem trade cost measure can be interpreted as follows: trade costs are considered higher when countries trade more domestically than they do internationally, and lower when they trade more internationally than they do domestically. This is because if trade costs vis-à-vis another country fall, then some of the production which was consumed domestically will be shipped overseas. For more details, see Duval et al. (2016).

Declarations

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[12] For a broader discussion, see Mold (2017).

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