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Do Export Costs Matter in Determining Whether, When, and How Much African Firms Export?

Wim Naudé[*] and Marianne Matthee[†]

Abstract

What is the impact of export costs on the speed and extent to which African firms exports? We answer this question using a sample of 49,584 (mostly formal) firms across 71 countries, including 5,839 firms in 16 African countries surveyed by the World Bank during 2002 and 2003. We find that firms in African countries face higher export costs on average than firms in other parts of the world. However we find that African firms are more likely to enter export markets, but that when they do the extent of their exports (exports as a share of their total sales) is on average less than that of firms elsewhere. Also, younger firms are more likely to start exporting than older firms. As for the impact on export costs, we establish that the costs of exporting (as measured in US dollars) lower the likelihood and the extent of African firms' exports but not when African firms start exporting.

Keywords: international entrepreneurship, exports, transport costs, firm heterogeneity, Africa

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1. Introduction

Exporting is not only of strategic importance for individual firms; it is potentially vital for a country's overall economic development. There is a widely held view in the economics literature that successful development in the global economy depends on the extent to which countries' entrepreneurs can discover and exploit opportunities in international markets by internationalizing their firms – in particular through exporting. Promoting exports may be especially important in Africa, the world's poorest continent. Here (as elsewhere) export growth can make a significant contribution to the recovery and acceleration of economic growth (Hausmann et al. 2005; Pattillo et al. 2005; Naudé and Gries 2009).

A growing body of literature has been directed at understanding the determinants of exports from African countries and African firms. This literature is reviewed in section 2 of this paper. A shortcoming is that the impact of transport costs[1] has been neglected – both in the international entrepreneurship literature, as well as in empirical work in developing countries. This paper addresses that shortcoming by providing preliminary empirical evidence of the extent to which transport costs – specifically, export costs – affect the decision of firms to export or not, and the extent of their exports if they do. We provide this evidence using firm-level data on 49,584 firms across 71 countries, including 5,839 firms in 16 African countries, surveyed in 2002 and 2003 by the World Bank as part of its Investment Climate Private Enterprise Survey.

The remainder of the paper is structured as follows. Section 2 contains the relevant background literature. Section 3 puts forward two hypotheses. Section 4 discusses our methodology. Sections 5 and 6 set out and discuss the empirical findings. Section 7 concludes.

1. Transport costs are defined as all trade and logistics costs in the movement of goods from producer to consumer. Since we are concerned with exporting we are particularly interested in shipping or export costs, and in the empirical work reported in sections 5 and 6 we use export costs (measured as the cost of shipping a container) as an (imperfect) measure of transport costs, which we refer to in the remainder of this paper as "export costs."

2. Literature review

We will survey the literature with the aim of generating testable hypotheses on the relationship between export costs and firm-level exporting in Africa. We will elaborate on these in section 3. Before that, however, we first provide a survey the main body of the international entrepreneurship (IE) literature and the "new" new trade theory on exporting (section 2.1). The determinants of exporting from Africa as found in the recent empirical literature are set out in section 2.2. The case for the potential significance of transport costs (and export costs specifically) in Africa is made in section

2.1 The current state of the literature

Two strands of literature have been concerned with explaining the determinants of exporting at the firm level: one in trade theory in economics and the other in international entrepreneurship in the business literature. We briefly summarize the essence of each strand in this section.

In economics, traditional trade theory assumed trade in perfectly competitive markets between homogenous (or representative) firms in a dimensionless space. Hence, the evolution of traditional trade theory into new trade models introduced imperfect (monopolistic) competition, iceberg (trade) costs, and fixed costs to make them more consistent with the empirical evidence.

More recently, practical concerns and empirical work emphasized that at the firm-level there is significant heterogeneity in export behavior. Not all firms export – even apparently similar firms in the same industry and the same context very often exhibit striking differences in their export behavior, both in terms of the intensive and extensive margins of trade.

How can this be explained? According to "new" new trade theory as initiated by Bernard and Jensen (1995), Melitz (2003), and others, differences in export behavior reflect

firm-level heterogeneity in terms of productivity – firms are not identical as assumed in new trade models. To survive in domestic markets, firms need to be productive. To export, and to invest abroad, they need to be even more productive. Hence one can conceive of different productivity thresholds that will divide existing firms into those that produce only for the domestic market, those that export and, at the highest levels of productivity, those that also invest abroad (i.e., multinational firms). Seen in this way, "new" new trade theory predicts that trade liberalization (or more generally any reduction in trade barriers, such as a decrease in transport costs) will increase aggregate productivity in an economy through a number of channels, namely through the exit with greater competition of low productivity firms that only serve the domestic market, more productive exporting firms exporting more and gaining additional profits from reduced barriers to exporting, and a re-allocation of production factors from less to more productive firms (Helpman, Melitz, and Yeaple 2004; Chang and van Marrewijk 2011).

In the earlier models, each firm's realized productivity level was a lottery: they faced "an exogenous ex-ante distribution of potential productivity levels" (Marin and Verdier 2007, 4). Firms are therefore ignorant *a priori* about their productivity levels. Once they enter the market, the outcome of the lottery for their firm becomes known, and they will either then immediately exit, or produce only for the local market, or export (and/or also invest abroad), depending on their realized productivity levels.

While a very helpful device for theorizing about observed firm-level heterogeneity in terms of productivity and exports, the assumption of productivity lotteries is inconsistent with a number of features. First, it implies that all exporting firms are early exporters, or international new venues ("born globals"). In other words, once the productivity distributions are known, firms immediately react either by quitting, exporting, or not exporting. All exporting firms are therefore born global firms in these models. They do not wait or learn or

grow, but immediately sort themselves into export and non-exporting markets (or quit altogether).

Empirical evidence is clear that many if not most firms that export did not start exporting at or soon after their birth. Indeed this brings us to the international business (entrepreneurship) literature. Here, the Johansen and Vahlne process (or stages) model of internationalization is based on the observation that older firms are more likely to export (Johansen and Vahlne 1977). This makes intuitive sense if one accepts that exporting is a complex process first requiring the development of some key firm capabilities: knowledge of foreign markets, for instance. Within the subsequent international entrepreneurship literature the main concern has been on understanding why firms, and in particular new ventures, export, while also identifying the factors that determined the speed and eventual extent of their exports (see, for instance, Johanson and Vahlne 1977; 1990; Oviatt and McDougall 1994; Autio et al. 2000). These are issues that have been somewhat neglected in the "new" new trade theory.

In the international entrepreneurship literature, the decision to internationalize is seen as based on various perceived benefits it may yield. For instance, it may contribute to the firm achieving economies of scale, improving productivity, innovating more, learning by doing, adopting new product ranges, and ultimately becoming more profitable. Evidence shows that firms that internationalize early may achieve better future sales growth performance (e.g., Autio et al. 2000; Barkema and Drogendijk 2007; Nadolska and Barkema 2007) – although Sapienza et al. (2006) argue that this may entail the risk of lowering the firm's probability of surviving.

As far as the speed of internationalization is concerned (i.e., how quickly after it is founded a new firm starts to export), the international entrepreneurship literature has been at pains to explain why firms would attempt to gain these benefits so soon after establishment given the risks involved. This stands in contrast to the "new" new trade theory. The literature has leant on the Resource Based View (RBV) of the firm. In the RBV of the firm, a firm's

capabilities and assets may entice it to expand internationally (Oviatt and McDougall 1994; Westhead et al. 2001). In the RBV, internationalization is largely the result of an entrepreneurial firm's strategic intent, in contrast to the PMI where internationalization is largely reactive and subject to inertia (Autio et al. 2000, 909). Hence, following the RBV, firms internationalize to exploit the potential of their capabilities and assets abroad.

Three types of capabilities or assets may be relevant for present purposes: (i) firm level capabilities (ii) industry-level features[2] and (iii) the institutional context (Yiu et al. 2007).[3] In the empirical part of this paper we will find measures for these types of capabilities to estimate the determinants of the decision and the extent of firm-level exporting in Africa. We will add to this transport costs as an independent determinant. Traditionally, transport costs have been neglected in trade theory in economics - only in the new trade theories initiated by Krugman (1979; 1980) has the role of transport costs[4] as a determinant of trade in international trade been recognized. In the international entrepreneurships literature, transport costs are acknowledged but are not seen as an obstacle. Further, a weakness in the international literature is that according to Zhou (2007, 285) "almost all the empirical evidence [on international entrepreneurship] has so far been obtained from firms in advanced western

2. For instance manufacturing firms are often more export oriented, for various reasons such as the high value-volume ratio of their products, the footloose nature of their processes, and their need for economies of scale. Also, if an industry is characterized by easy access and a high degree of competition, a firm may wish to internationalize (and internationalize sooner rather than later) in order to capture a larger market share (Alon and Lerner 2008). A larger market share may however also imply a home market effect, i.e., a firm with a larger domestic market share may be in a better position to extend its reach into foreign markets.

3. The institutional environment will determine the "rules of the game" within which the firm operates. This will influence whether the firm is enabled or obstructed in its international expansion. An environment where firms face heavy regulations, insufficient protection of property rights, high levels of corruption, a weak capital market, and inadequate business infrastructure may constrain both new start-ups and firm growth (e.g., Fonseca et al. 2001; Klapper et al. 2006; Shaw and Darroch 2004). The literature on African firms is aware of these constraints. Institutional weaknesses may therefore impact negatively on the resources and capabilities of a firm and may limit the speed and extent to which new ventures can export.

4. Samuelson (1952) introduced the concept of "iceberg" transport costs. Transport costs explained in this manner are unique, as it allows for the incorporation of a transport sector into a model, without having to deal with costs or spending from that sector (Brakman et al. 2001; McCann 2005). Goods can be shipped freely, but only a fraction of goods (g) arrive at the relevant destination, with (1 - g) lost in transit (i.e., it "melts" away). The fraction lost in transit equals the incurred transport cost (Krugman 1980; Fujita and Krugman 2004). According to Fujita and Krugman (2004), using "iceberg" transport costs has two advantages. First, it eliminates the need to analyse the transport sector as another industry. Second, it simplifies the description of how monopolistic firms set their prices (erasing the incentive to absorb transport costs, charging a lower FOB price for exports than for domestic sales).

economies." Hence, in this paper our focus on African firms is also intended to help fill this gap in the international entrepreneurship literature.

Following new trade theory, the importance of transport costs in trade to and from developing countries has been increasingly emphasized. In the new trade theories and theories of geographical economics, geography, distance (transport costs) and the "home-market" effect act as incentives for trade. Distance is an important part of international trade relations and the impact of distance on trade has been widely documented. As distance increases, trade volumes decrease (Venables 2001). Countries tend to trade with proximate partners (Grossman, cited in The Round Table 2004), even if transport costs over distance have fallen (Hummels 1999). Approximately half of the world's trade takes place between countries located within 3,000 km of each other (The Round Table 2004). The distance of trade for the average country has decreased, implying that distance matters (Carrere and Schiff 2004). A possible reason for this is that distance is costly. It directly increases transaction costs in terms of additional transport costs of shipping goods, time costs of shipping date-sensitive goods, the costs of contracting at a distance (search costs), the costs of obtaining information on remote economies, and the costs of communicating with distant locations (Overman, Redding, and Venables 2001; Venables 2001). This is particularly the case for developing countries: for instance, Radelet and Sachs (1998) analyze the impact of transport costs on developing countries' international competitiveness. They find that transport costs are influenced by geographical factors such as distance to markets and access to ports, which in turn have an effect on manufactured exports and long-run economic growth. Compared with countries that face relatively high transport costs, countries with lower transport costs have experienced more rapid growth in manufactured exports as well as faster overall economic growth over the past three decades. High transport costs elevate the cost of producing manufactures by increasing the price of imported intermediate and capital goods. These elevated production costs, together with high transport costs, impede the price competitiveness of manufactured exports (Radelet and Sachs

1998; Hoffmann 2002). Limão and Venables (2001) conclude that geography is paramount to successful trade and find that landlocked developing countries tend to have higher transport costs (approximately 50 percent) and lower trade volumes (around 60 percent) than coastal countries.

In the next section, we consider the current literature on the determinants of exporting from Africa, and note that despite the growing recognition in the economics literature of the importance of transport costs, little empirical evidence has yet been gathered on African firms. We go on to note the significance of transport costs in Africa, arguing in particular that it is time to empirically estimate the impact on exports of the high export costs that confront firms on the continent.

2.2 Determinants of exporting from Africa

In studying the export behavior of entrepreneurs, the international entrepreneurship literature has emphasized that there are various stages through which entrepreneurs will take their firm (see, for instance, Johanson and Vahlne 1977; 1990). The first is the decision on whether or not to enter export markets (export initiation). Many firms never start exporting, whilst many on the other hand start exporting a quite an early age. Indeed the growth in the number of young firms exporting has been described as "early internationalization" or "international new venues" and as the "born global phenomenon" (McDougall and Oviatt 2000). The second stage, once an entrepreneur has decided to export, concerns the extent and mode of exporting. For instance entrepreneurs can export directly or indirectly (through intermediaries) and can decide as part of their firm's strategy to grow exports as a share of total sales. In the following, we ask what is known from the existing literature on export initiation by African firms, and what is known about the extent and mode of exporting by African firms.

First, as far as export initiation is concerned, the theoretical point of departure in the literature (and not just the Africa-focused literature) has been to note that when entrepreneurs

decide whether or not to export, the decision is subject to sunk (fixed) costs (Medin 2003). Sources of these sunk costs include investing in learning and gathering knowledge about foreign markets, building a product brand, using R&D and other means to improve product quality to meet international specifications, and marketing, amongst others (Jean 2002). Dixit (1989) shows how the presence of sunk costs can lead to hysteresis in subsequent behavior. Thus, if there are significant sunk costs in exporting, one would be likely to see more firms in the export market in a particular year than had been there in the previous year. Roberts and Tybout (1997) present empirical evidence from firms in Colombia to support this notion. In their influential paper, firms with a previous year of export experience were up to 60 percent more likely to export than similar firms who had never exported.

Jean (2002) points out that sunk costs may largely reflect productivity-enhancing investments (such as R&D). This has also been taken in the literature to imply that firms will only export once their productivity exceeds a certain threshold. Evidence from the African literature seems to support this. For example, Fafchamps et al. (2008) found that in Morocco firms that were more productive self-selected into exporting. Naudé and Serumaga-Zake (2003) established that in South Africa, more productive manufacturing firms were more likely to export. A 10 percentage point increase in efficiency (calculated using a stochastic production frontier methodology) was found to increase the probability of exporting by 19 percent and the intensity of exports by 12 percent. Van Biesebroeck (2005a; 2005b) confirms that exports are associated with higher productivity in Africa.

On the other hand, it has also been established in Africa that firms can improve their productivity through exporting, which can deliver efficiency gains. Using World Bank firm-level panel data from Cameroon, Ghana, Kenya, and Zimbabwe over the period 1992 to 1995, Bigsten et al. (1999) found that exporters achieved more rapid efficiency gains over the period than non-exporters did. Also, new exporters had the largest subsequent efficiency gains, controlling for other characteristics. They report that this effect of exporting on efficiency

appears to be larger in Africa than in comparable studies of other regions, and is in contrast to most of the empirical results in the "new" new trade theory.

Part of the literature has been concerned to identify the factors that determine firm productivity/efficiency. One of these factors is a firm's capital-labor ratio. Firms with a higher capital-labor ratio are more likely to improve price competitiveness because of a lower unit labor cost (Biggs and Raturi 1997).

Other researchers have also identified the personal characteristics of the entrepreneur, such as education and experience, as an important contributor to firm productivity (Naudé et al. 2008). For instance, in the African context, Goedhuys and Sleuwaegen (2000) link better-educated entrepreneurs with better firm growth. Elsewhere, better-educated and experienced entrepreneurs are associated with larger firms.

The size of a firm itself has been found to be an important determinant of its likelihood to export. It is often found in firm-level studies that there is an inverted U-shape relationship between firm size and exports (Kumar and Siddharthan 1994). In the case of Africa, Naudé and Serumaga-Zake (2003) (using firm-level data from South Africa) found that in their sample, 63 percent of large manufacturing enterprises were exporting, compared with only 41 percent of smaller manufacturing firms (those with less than 100 employees). Moreover, for the larger firms, exports per employee were US$2,100 in 1999, whilst for smaller manufacturing firms it was US$1,600. Broadly similar results were found by the World Bank from manufacturing firm-level surveys in Cameroon, Ghana, Kenya, and Zimbabwe. Here the Bank found that only 31 percent of firms were exporters but that across all four countries 71 percent of large firms export (Bigsten et al. 1999). Van Biesebroeck (2005a; 2005b) also presents evidence that firm size matters for exports in Africa.

As far as the determinants of the extent of exports are concerned, it should be noted that many of the determinants of the export initiation decision discussed in the previous section are also determinants of the extent of exports. In practice, it may be difficult to distinguish how

these factors affect the different stages, unless an appropriate econometric methodology is used. This is a major reason why we adopt a sample selection of models in this paper to investigate the determinants of the internationalization process in Africa.

However, the extent of exporting does appear to be very sensitive towards the institutional and regulatory burdens that firms face. Thus, it has been maintained that institutional and regulatory burdens and their transaction costs can explain the failure of African firms to diversify exports from primary commodities into manufacturing. Higher value-added exports, such as manufactured goods, are very transaction intensive – they typically require intensive support services (see Elbadawi 1998). Using an index of corruption, length of paved roads, and the number of fax machines as a proxy for transaction costs, Elbadawi (1998, 13) finds, in an empirical study of African countries, that transaction costs are a major determinant of exports.

Recently, a growing number of studies have focused on clustering/agglomeration and market access as *both* market-level and firm-level determinants of firms' decision to export or not, as well as on the influence that these factors have on the extent of exporting. These studies have been influenced by the new economic geography's insight that the spatial concentration of economic activities matters. Thus, geography-induced factors such as agglomeration (Warner 2002) have been recognized as important determinants of firms' export success, in terms of export initiation, export growth, and export diversification (Naudé et al. 2008; Gries et al. 2009). According to Davis and Weinstein (2003), the market structure and consumers' love-of-variety (Krugman 1980) create a "home-market effect", i.e., only regions with a large enough home market for a specific variety of good, characterized by increasing economies of scale, will be net exporters of that good.

In Africa, both low degrees of agglomeration and a small home market may help explain the lack of growth in the extent of its firms' exports. Consider for instance that where small firms do succeed in exporting, it is often found that this is due to networking

externalities in industrial districts (Schmitz 1995). The spatial density of economic activity in such districts or clusters is a positive factor for firm-level productivity (Overman et al. 2001). However, in Africa there has not traditionally been a strong clustering of firms (see McCormick 1999). Also, economic growth has stagnated in Africa over the past four decades, leaving economies that are small in the international context. Even within countries the existence of nearby local markets are indicative of the importance of the home-market effect. Naudé and Gries (2009) find that the home-market effect is a significant determinant of exports in the South African case. Matthee and Naudé (2008), using sub-national data from 354 magisterial districts in South Africa, also find that the determinants of manufactured exports are the "home-market effect (measured by the size of local GDP) and distance (measured as the distance in km to the nearest port).

Generally though, none of these studies have quantified the impact of transport costs on the decision to export, and the extent of subsequent exports, in the case of African firms. The potential importance of transport costs have however been adequately recognized in recent years (as the next section will document) and the studies of Naudé and Gries (2009), Gries et al. (2009), and Matthee and Naudé (2008) make explicit provision for transport costs to influence the location and extent of exporting, but do not estimate the actual impact of such costs due to a lack of available data.

2.3 The significance of transport cost in Africa

The previous sub-section noted that the empirical literature has identified in the case of Africa major determinants of the decision to export and the extent of exporting to include firm size, the experience of the entrepreneur, productivity and capital intensity of the firm, networking and agglomeration, the size of the home market, and the regulatory/institutional environment. The literature has not yet adequately dealt with the influence of transport costs on the internationalization behavior of firms, nor with the speed with which firms internationalize

after being founded (i.e., We do not know the extent to which the "born global" phenomenon is relevant in Africa.), nor with the mode of exporting.

The lack of empirical studies on the importance of transport costs is a significant weakness in the literature, because transport costs are significant in Africa – in fact more so than elsewhere. Naudé and Matthee (2007) discuss the extent and impact of high transport costs in Africa and conclude that it creates a barrier that limits development in Africa. High transport costs in Africa can be inferred from both measures of remoteness (being landlocked), distance,[5] insufficient economies of scale in production, poor investment in transport infrastructure, and the trade and transport policies of African governments (Naudé and Matthee 2007).[6] Transport costs are here defined broadly as all costs included in the transfer of physical goods from the exporter to the importer, such as the cost of handling, freight, insurance, and tariffs (Brakman et al. 2001). Table 1 provides a summary of measures of remoteness, shipping or export costs, and transport infrastructure, comparing Africa with other world regions.

Table 1. Measures of transport costs in sub-Saharan Africa and elsewhere

Region	Average distance from major trading partners in 1990[a]	Average Transport Costs ($ per container from Baltimore)[b]	Road Density (km^2 of road per surface area in 1999)[c]
East Asia and Pacific	7,257 km	3,900	0.719
Eastern Europe and Central Asia	5,011 km	-	-
Latin America and the Caribbean	8,898 km	4,600	0.122
Middle East and North Africa	-	2,100	0.334
South Asia	-	3,900	0.850
Sub-Sahara Africa	7,860 km	7,600	0.130

Sources: [a] Marquez-Ramos et al. (2007, 20-21); [b] Ndulu et al. (2007a, 101); [c] Ndulu et al. (2007b, 29).

Table 1 shows that in Africa, the median export cost in intra-regional trade for a 40-foot container is US$7,600, which is significantly higher than in other regions. It also shows that in 1990, the average distance of African countries from their trading partners was over

5. Distance is one of the most important variables determining transport costs. A 1 percent increase in distance increases transport costs by approximately 0.25 percent (Martínez-Zarzoso et al. 2003).

6. For a more extensive discussion see Naudé and Matthee (2007) and Naudé (2009a).

7,800 km. Given that gravity models have estimated that the elasticity of trade with respect to distance ranges between -0.9 and -1.5, the implication is that trade volumes in Africa will be 90 percent lower than what they would have been had the exporter been within 1,000 km of its main trading partners (Venables 2005, 65). Export costs can thus be expected to have a significant impact on international entrepreneurship in Africa.

In Table 2, we broaden our concern to fully include trade logistics. According to Coulibaly et al. (2009a) trade logistics include international shipping, activities at the port and inland transport. A logistics system therefore involves more than one mode of transport and specific organizations (either government or private agencies) assisting in the international flow of goods. In this regard, the World Bank's *Logistics Performance Index* (LPI)[7] provides an internationally comparable set of cross-country indicators covering various aspects of trade logistics. Table 2 shows that Africa underperforms the rest of the world in all aspects of logistics.

Table 2. Average LPI score of each performance area of African countries and the world

	Performance area	Africa	World	World (excl. Africa)
Overall score		47	55	58
(i)	Efficiency of the clearance process by customs and other border agencies:	44	51	54
(ii)	Quality of transport and information technology infrastructure for logistics:	42	52	55
(iii)	Ease and affordability of arranging international shipments:	47	54	57
(iv)	Competence of the local logistics industry:	46	54	57
(v)	Ability to track and trace international shipments:	46	55	58
(vi)	Domestic logistics costs:	59	58	57
(vii)	Timeliness of shipments in reaching the destination:	55	63	67

Source: Authors' own calculations using the LPI 2007 scores from Arvis et al. 2007 which were converted into percentages

7. The LPI was constructed for the World Bank following a survey of over 800 logistical service providers. The survey evaluated the following seven logistical performance areas: efficiency of the clearance process by customs and other border agencies, quality of transport and information technology infrastructure for logistics, ease and affordability of arranging international shipments, competence of the local logistics industry, ability to track and trace international shipments, domestic logistics costs, and timeliness with which shipments reaching their destination (Arvis et al. 2007a, 8).

Landlocked African countries are even more susceptible to poor logistics systems than their coastal counterparts. Coulibaly et al. (2009b) estimate that these countries' shipping rates increase by between 10 and 30 percent, because of delays at borders and restricted access to international markets. Transport costs in Africa are also higher because of lower economies of scale in multimodal transport (Arvis et al. 2007b). Here, the interchange between modes of transport is obstructed in many African countries due to a lack of infrastructure accommodating the interchange, the transport operators not knowing who is responsible for the interchange and delays caused by the collection of taxes and bribes by corrupt customs officials (Coulibaly et al. 2009b). Coulibaly et al. (2009b) estimate that bribes and unofficial payments increase transport costs between a landlocked country and a port by 50 percent. Another problem African countries face is the competence of their logistics operators. The continent is characterized by inadequate regulations and an absence of competition in the logistics industry, which in many cases contribute to corruption and/or poor services (Arvis et al. 2007b).

All of these aspects, namely the physical movement of goods (and transport costs), import and export procedures, information and telecommunication technology, payments, insurance and other financial requirements and international trade standards can be categorized under the term trade facilitation (African Trade Policy Centre 2004). Trade facilitation, according to the World Trade Organization, can be defined as "the simplification and harmonization of international trade procedures" where the procedures are the "activities, practices, and formalities involved in collecting, presenting, communicating, and processing data required for the movement of goods in international trade" (Grainger 2007, 4). Table 3 contains various measures of trade facilitation and compares Africa with the rest of the world.

Table 3. Trade facilitation measures of African countries and the world

Trade facilitation measure	Africa	World	World (excl. Africa)
Trading across borders[a]			
Number of documents for export	8	7	7
Number of days for export	34	26	23
Cost to export (US$)	1586	1230	1088
Number of documents for import	9	8	7
Number of days for import	42	30	25
Cost to import (US$)	1900	1412	1217
Liner shipping connectivity (out of 100)[b]	10	19	21
Enabling trade[c]			
Market access	49	59	62
Tariff and non-tariff barriers	49	60	63
Proclivity to trade	53	59	60
Border administration	48	61	64
Efficiency of customs administration	47	59	62
Efficiency of import-export procedures	44	55	58
Transparency of border administration	50	63	67
Transport and communications infrastructure	47	58	62
Availability and quality of transport	39	52	56
infrastructure	44	55	58
Availability and quality of transport services	44	55	57
Availability and use of ICTs	29	47	52

Sources: [a] World Bank 2008b, 97-99; [b] UNCTAD 2007; [c] World Economic Forum 2008, 16-25. The scores of the trade enabling index were converted into percentages.

The first measure in Table 3 is the international trade division of the World Bank's Doing Business report. According to the World Bank (2008b), Africa's record in all of the aspects classified under "trading across borders" is much worse than that of the rest of the world, especially in costs and delivery times. The second measure of trade facilitation in Table 4 is liner shipping connectivity, as recorded by UNCTAD. Liner shipping connectivity provides an indication of a country's efficiency in its shipping capacities. African countries have noticeably smaller maritime transport capabilities compared with the rest of the world, and this influences their access to international markets. The third measure in Table 3, compiled by the World Economic Forum (WEF), takes into account various aspects that enable trade, namely factors, policies, and services that make it easier to move goods into a country (Lawrence et al. 2008). Again, Africa lags behind the rest of the world. Looking at the

performance of African countries in the sub-indices of market access and border administration, their policy frameworks and administration at border facilities are more than 10 percent less facilitating and efficient than those of other countries. Once goods are in a country, transport and communications infrastructure is required to move them to their final destination. Here African countries are also below average, especially in information and communication technology services. Given the increased importance of communication in world trade, this is indeed worrisome (Lawrence et al. 2008).

3. Hypotheses

The literature review in section 2 has established that there is scope for greater exports by African entrepreneurs and that the current literature has largely focused on the way in which the entrepreneur's characteristics and the regulatory/institutional features have influenced export behavior. We also established that transport costs are a potentially important determinant of African firms' export behavior, but one that has hitherto been relatively neglected. Given the current economics and business literatures (section 2.1) we can now derive a number of hypotheses to test in the remainder of the paper.

H1: Export costs significantly lower the probability of export market entry by African firms and the subsequent extent of exports in their sales.

Comment: In section 2, we presented evidence on the comparatively high export costs faced by potential exporters in Africa. The impact of high export costs on the internationalization behavior of African entrepreneurs has been neglected in the literature. Given the generally large distances between African countries and world markets, we therefore expect transport costs to matter, and expect firms in African countries with lower export costs to be more likely to enter export markets and grow their export shares.

H2. Young African firms (those three years old or younger) may be more likely to export than older firms despite facing various constraints, including higher export costs.

Comment: In section 2 we discussed the phenomenon of "born global" firms, namely firms that start exporting (or investing abroad) within three years of their founding. We noted that the nature of global competition often creates strategic imperatives for young firms to start exporting. In Africa, where domestic circumstances may often be difficult, younger, less established firms may be pushed into exporting. This may also be due to demonstration effects in an era of globalization. However, Naudé (2009b) found evidence from China suggesting that sometimes early internationalization (exporting) will take place because entrepreneurs may overestimate the ease and lucrative nature of internationalization and underestimate its challenges. There, he found that when entrepreneurs had more exporting experience or were within foreign firms, they would temper the speed (age) at which they start exporting. Because the question of the speed (age) at which African firms internationalize has to the best of our knowledge been neglected in the literature, we will explore these issues with the present data – although we do recognize that using cross-section data does limit the eventual extent of our analysis. We expect that, as in the case of China, that entrepreneurs may be "rushing into" exporting in Africa and that with age and experience; the probability of them entering foreign markets may in fact decline.

4. Methodology

4.1 Estimators

Because of the nature of our dataset and the hypotheses we wish to test, and to consider as well the robustness of our results we will use a combination of Double Probit (or biprobit) and Heckman two-step estimators. The Double Probit estimator will be used to

identify the determinants of the probability that a firm will initiate exports before it is three years old (the definitional cut-off point for being a "young firm"), while the Heckman two-step estimator will be used to estimate in the selection stage the determinants of the probability that a firm will export, and in the outcome stage the determinants of the extent of exports.

Use of sample selection estimators such as the Double Probit and Heckman two-step estimators are advisable, since there are a large number of firms with no exports in a particular year. For instance in our African firm-level dataset, only 1,989 of 5,839 firms indicated that they exported. Instances of zero exports may not be random, but due to some particular features of the individual firms so that using an OLS estimator could lead to biased estimates. In essence, outcomes are observed only for firms that selected to export. If the factors that determine the choice/selection to export or not differ from those that determine the volume of exports, not taking the selection into account is tantamount to subjecting the model to an omitted variable bias (Heckman 1979).

Use of the Heckman two-step sample selection estimator is also appropriate in the present case as it corresponds to the notion that firms go through stages in the internationalization process. Thus we can take into account the fact that there is a difference between the probability that a particular firm will export (the selection stage), and the level of exports once there is positive exports (the outcome stage). The latter will correspond to later stages in the export development/internationalization process. Firms select to export, and then decide how much to export. As they obtain more experience they will be entering export markets in a more meaningful way.

4.2 Variables and data

Our dependent variables are whether a firm exports or not (a discrete variable =1 if it does export and = 0 if it does not), and if it does (if X = 1), the level of its exports, measured as

a percentage of the firm's total sales. The dependent variables were all obtained from the World Bank's Investment Climate Survey conducted in 2002 and 2003.

Our explanatory variables and their sources are listed in Table 4. In accordance with the literature survey in section 2, we group these variables into firm-level capabilities, industry-level determinants, and institutional determinants. These are the typically determinants of international entrepreneurship as studied in the literature (see section 2). In light of the discussion, we added transport-related determinants.

The majority of our explanatory variables were also obtained from the World Bank's Investment Climate Survey. In our first regression result (section 5) we use the entire dataset, to determine whether African countries are different from others in terms of export behavior. This dataset covers 49,584 firms across 71 countries and is described in more detail in Naudé and Matthee (2011). For hypotheses H1 and H2 we confine our dataset to the African countries in the sample. The dataset includes 5,839 firms from sixteen African countries – largely Sub-Saharan Africa, but including two North African countries: Algeria, Benin, Egypt, Kenya, Madagascar, Mali, Mauritius, Senegal, Tanzania, Uganda, Eritrea, Ethiopia, Malawi, Morocco, South Africa, and Zambia. Summary statistics of our variables are contained in the Appendix.

Table 4. Variables and data sources used in firm-level regressions

Variable	Description	Source
Firm Capabilities		
Age of firm	The length of time that the firm has been in business in the country, calculated as the difference between the date of the survey and the start date	1
Firm size	Number of employees in the firm	1
Network member	Is the establishment/firm a member of a business association or chamber of commerce?	1
Foreign shareholding	Ownership dummy, 1 = foreign ownership and 0 = domestic ownership	1
Government owned	Government ownership dummy, 1 = government ownership and 0 = otherwise	1
Experience in exporting firm	Did any prior firms of the top manager export? 1 = YES, 0 = NO	1
Industry Specific Determinants		
ISO	A dummy variable = 1 if the firm has received ISO certification	1
National market share	Share of national market (%)	1
Manufacturing sector	A dummy = 1 if the firm is a manufacturing firm	1
Institutional Determinants		
Bribes	% of annual sales as payments to public officials to get things done	1
Government regulation	The % of senior management's time spent dealing with government regulations	1
Transport Cost Measure		
Export costs	The cost to export (US$ per container)	2

Sources: World Bank 2002/2003; World Bank 2008b

Table 4 shows that we will use only one measure of transport costs, namely export costs as measured by the cost in US dollars per container to export. The data for this measure were obtained from the World Bank's *Doing Business Indicators* dataset and reported for 2007, which post-dates the variables obtained from the 2002/2003 enterprise surveys. Our assumption is that transport costs would not have changed that markedly over a relatively short period of four years, an assumption supported by recent research, which found that transport

costs are characterized by a degree of inertia over the short to medium term (see, for instance, Anderson and Van Wincoop 2004; Disdier and Head 2008).

We use only one measure of transport costs (export costs in US dollars) and not the host of (useful) logistics performance measures discussed in section 2.3 (see tables 2 and 3) because (i) these different measures are highly correlated and will thus introduce the problem of multicollinearity (see Naudé and Matthee 2011), (ii) export costs will to a degree reflect a country's performance on these measures,[8] and (iii) these measures are relative indices meant to compare countries, and are not well suited to interpretation in a regression model aimed at identifying the impact of transport costs on exports.

We must mention here another shortcoming of our study, namely that we use firms across all manufacturing sectors, and not in a given industry. The disadvantage is that the sensitivity to transport costs may differ across industries; for firms in high-value industries transport costs may be less of a constraint.

5. Findings: Descriptive statistics

What do the data tell us? First, based on the descriptive data we find in fact that African firms may on average be more likely to export. Consider the summary provided in Table 5 comparing the African sample with the rest of the world.

8. A simple linear regression of the logistical performance index on export costs finds that the former is negatively and significantly related to the latter, implying that improvements in a country's logistics index value would be associated with a decrease in export costs. The logistical performance index explains 18 percent of the variance in export costs.

Table 5. Exporters and non-exporters: World sample and African sample compared

Variable	All Exporters (N= 15,277)	African Exporters (N=1,989)	All Non-Exporters (N= 33,432)	African Non-Exporters (N=3,705)
Firm capabilities				
Average age of the firm (in years)	18	18	16	20
Average number of employees (size of the firm)	237	185	158	139
Frequency of firms foreign owned	19%	20%	10%	13%
Firm performance				
Average percentage of export share	50%	51%	-	-
Average percentage of employee growth over the last 3 years	25%	22%	58%	38%
Average percentage of sales growth over the last 2 years	91%	97%	5%	19%
Industry-specific determinants				
Average number of competitors in the domestic market	44	29	33	28
Share of domestic market	23%	25%	22%	24%
Frequency of firms in the manufacturing sector	78%	87%	56%	85%
Institutional-specific determinants				
Average percentage of bribes paid	1.35 %	1.95%	1.43%	2.19%
Average percentage time dealing with government regulations	8%	11%	8%	10%

Source: Authors' calculations based on World Bank data, 875 missing values in the global sample and 145 in the African sample

Table 5 is based on firms reporting being exporters or not. In the top row we can see that 1,989 (out of 5,839) firms reported exporting at the time of the survey. This is 34 percent of the sample, and compares to 31 percent of firms that exported in the global sample (15,277 out of 48,709). This is a relatively high percentage when compared to that from specific country studies. For instance, in Canada 12 percent of firms were found to export, and in Australia only about 4 percent (Naudé and Rossouw 2010). In contrast, in Africa previous studies have found the percentage of manufacturing firms that export to range from a low of 3.7 percent in Ethiopia to 25 percent in Kenya (see, for instance, Mengistae and Pattillo 2004;

Riding et al. 2007). In China, one of the world's foremost export-driven economies, the proportion of firms found exporting ranges from 23 percent (Girma et al. 2006) to 27 percent (Naudé and Rossouw 2010).

Further tentative evidence is provided in Table 6, where international new venues are compared with other firms who were older at the time of first exporting.

Table 6. New international ventures and later exporting firms: world sample and African sample compared

Variable	All INVs (N= 5,110)	African INVs (N=704)	All Later Exporters (N= 4,381)	African Later Exporters (N=576)
Firm capabilities				
Average number of employees (size of the firm)	364	311	352	290
Frequency of firms foreign owned	34%	33%	14%	24%
Firm performance				
Average percentage of export share	33%	21%	23%	15%
Average percentage of employee growth over the last 3 years	29%	32%	26%	34%
Average percentage of sales growth over the last 2 years	41%	58%	26%	40%
Average age of the firm when it started exporting (in years)	0.69	0.68	19	19
Industry-specific determinants				
Average number of competitors in the domestic market	44	28	20	11
Share of domestic market	18%	28%	26%	39%
Frequency of firms in the manufacturing sector	83%	75%	89%	86%
Institutional-specific determinants				
Average percentage of bribes paid	1.48%	1.88%	1.31%	1.36%
Average percentage time dealing with government regulations	9.%	14%	10%	14%

Source: Authors' calculations based on World Bank data, 40,093 missing values in the global sample and 4,559 in the African sample

Table 6 indicates that a total of 704 exporting firms started to export within their first three years of existence. This means that about 35 percent of exporters in the African sample

are international new venues (as compared to 33 percent in the global sample), implying that the born global phenomenon is also significant in African countries compared to other countries. It supports hypothesis H2.

The data summarized in Tables 5 and 6 also allow us to consider why the prevalence of exporting and of international new venues may be so high in Africa[9]. For instance, from Table 6 it can be seen that on average, African exporters face slightly more competitors in the domestic market than non-exporting African firms (29 as against 27). When we make the split between international new venues and established firms, is clear that international new venues report facing more than twice as many competitors (28 as against 11) in the domestic market than do more established exporters. This may be consistent with the discussion in section 2, which described how domestic competitive measures are often a motivating factor for firms to start exporting. Also, the idea that exporting and early exporting is part of a firm's strategy to increase revenue and growth is supported by the data on firm performance in Tables 5 and 6. These tables show that the average exporting firm around the world enjoyed average sales growth in the two years preceding the survey of around 97 percent, as compared to the average growth of only 18.5 percent enjoyed by non-exporting firms. Similarly, international new venues in Africa achieved average sales growth of 58 percent compared to the 39 percent of later exporters.

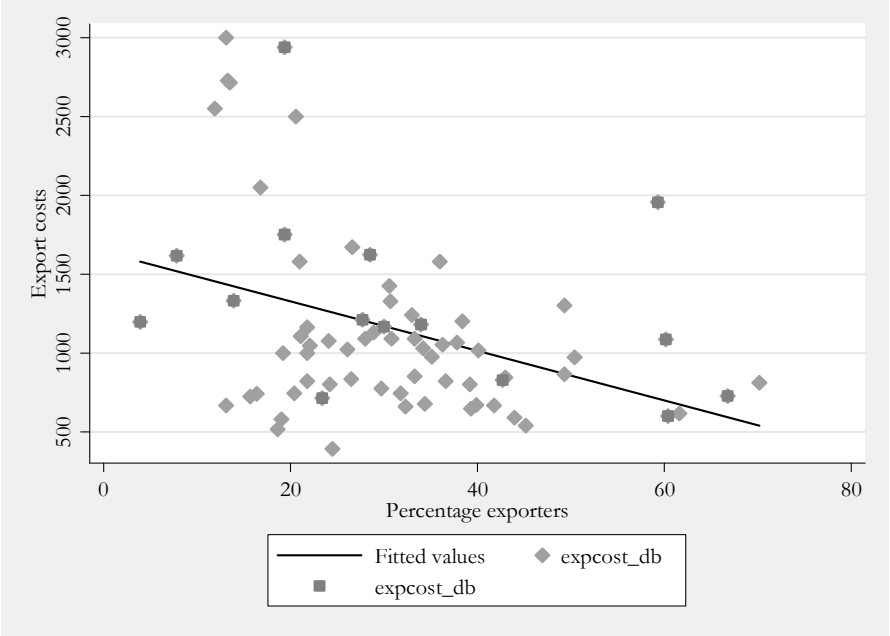
In section 2 we also mentioned institutional constraints and high transaction costs, measured here by regulations and bribes, as important potential determinants of exporting. Although Table 6 indicates that there is no significant difference in bribes paid or regulations between exporting or non-exporting firms, we do find (not shown in the Tables) that larger firms pay proportionally smaller bribes (around 2 percent) than smaller firms, and experience higher sales growth. This is consistent with the finding of Chen et al. (2008), who established

9. Although there is a large informal sector in Africa that exports very little, the samples we use consist of formal firms and these are comparable to those formal firms in other countries. So at least as far as formal firms are concerned, the result suggests a high prevalence of exporting from Africa.

that firms with bigger sales are less likely to pay bribes due to the fact that they have the resources to afford legal action when necessary. In the African sample, all of the firms pay higher bribe percentages than firms in the global sample, consistent with other findings suggesting a difficult institutional environment for exporters in Africa.

Finally, as far as the relationship between export costs and exports are concerned, it is perhaps most useful to present some tentative visual evidence. Figure 1 contains a scatter-plot and fitted regression line of the percentage of exporters and the cost to export a container in US$ in all countries. The graph in figure 1 provides tentative evidence of a negative relationship with which we cannot reject hypothesis H1.

Figure 1. Percentage of exporters and export costs (US$ per container)



Source: Authors' calculations based on World Bank 2002/2003 and World Bank 2008b.

To conclude, the tentative evidence presented in this section from summarizing the data from the World Bank surveys tend to be consistent with the three hypotheses advanced in section 2. In the next section we present more rigorous econometric evidence.

6. Findings: Regression analyses

6.1 Are African firms really more likely to export?

To test the tentative finding in section 5 that formal firms in Africa may on average be more likely to export but with exports as a lower share of their total sales, we estimated a Heckman two-step selection model, where in the selection stage the dependent variable is a discrete variable = 1 if a firm exports, and = 0 if it does not, and in the outcome stage the dependent variable is the share of exports in total sales. Data for the entire world sample of 71 countries were used and a dummy variable = 1 if a country is an African country was added. The statistical significance of this dummy variable would suggest that firms in African countries are on average different from the rest of the sample in terms of the decision to export and the extent of subsequent exports.

The regression results are contained in Table 7. Before discussing the results we should point out that the explanatory variables used in the selection and outcome stages differ slightly. This is to achieve an appropriate statistical identification. As explained by Cameron and Trivedi (2009, 546) "For more robust identification, it is usually recommended…that exogenous restrictions be imposed. This requires that the selection equation have an exogenous variable that is excluded from the outcome equation." Here we select ISO accreditation and whether the firm is in the manufacturing sector as the excluded variables. The reason is that it may safely be assumed that ISO accreditation is more of an obstacle in deciding to enter export markets in the first place, than on the extent of subsequent exports, and that manufacturing firms may be *a priori* more likely to export than non-manufacturing firms, but not necessarily likely to export more when then do. We make the same exclusion assumption in the regressions reported in Tables 7 and 8.

In the bottom panel of Table 7, the selection stage shows that the significant determinants of the probability that a firm in the global sample will initiate exports are export

costs, the age of a firm, its national market share, whether the entrepreneur/manager had prior experience in exporting, and whether the firm is a manufacturing firm. The signs are as expected, indicating that higher export costs will discourage export initiation, that older firms will be less likely to start exporting, that a large national market share assists firms in breaking into world markets, that prior export experience helps, and that being a manufacturing firm raises the probability of exporting. These findings are consistent with the discussion of the literature in section 2. The table also shows importantly, in terms of hypothesis H1, that being a firm in an African country raises the probability that the firm would be an exporter.

The upper panel of Table 7, the outcome stage, suggests that the determinants included here do not do such a good job of identifying the determinants of the extent of firms' exporting. Age, prior exporting experience, and national market share remain important determinants, although now export costs are not significant. However the significant lambda in the diagnostics indicates that the two-step selection model is appropriate.

For present purposes, we are not as interested in the determinants of the extent of exporting in the global sample (for that, see the accompanying paper by Naudé and Matthee 2010). Rather, we are interested in whether African firms are different. In this respect the upper panel of Table 8 provides confirming evidence in that the coefficient on the African location of firms is both significant and negative, indicating that a firm located in an African country will on average have a lesser share of exports in total sales.

Table 7. Heckman two-step regression results (dependent variables: decision to export and subsequent export share)

Variable	Selection Stage: Export Decision		Outcome Stage: Export Share	
	Coefficient	Standard Error	Coefficient	Robust Standard Error
Export costs	**-0.00**	0.00*	0.00	0.00
Age of firm	**-0.00**	0.00***	-0.35	0.07***
For. shareholding	0.06	0.06	-1.37	2.91
Market share	**0.00**	0.00***	**0.18**	0.04***
Prior experience	**0.22**	0.05***	**8.03**	3.00***
Bribes	0.00	0.00	-0.00	0.19
Manuf. sector	**0.45**	0.06***	-	-
Gov. regulations	-0.00	0.00	0.09	0.08
ISO accreditation	0.03	0.06	-	-
Firm size	0.00	0.00	-0.00	0.00
Network	0.06	0.05	-1.96	2.35
African country	**0.40**	0.07***	**-26.06**	3.97***
Constant	-0.71	0.09***	37.25	11.68***
Diagnostics				
No. of obs	3039			
Censored obs	1939			
Uncensored obs	1099			
Wald χ^2	273.78***			
ρ	0.44			
λ	16.91*			

Note: Here ***, ** and * indicate significance at the 1%, 5% and 10 % levels respectively. Source: Authors' calculations.

6.2 Hypothesis H1

To test hypothesis H1, that transport costs significantly lower the probability of export market entry by African firms and the subsequent extent of exports in their sales, we applied a Heckman two-step estimator to the sample of firms from the 16 African countries in the sample listed in section 4.

The regression results are contained in Table 8. Again, the significance of lambda suggests that it is appropriate to use a sample selection estimator.

Table 8. Heckman two-step regression results for African firms' decision to export and extent of exports

Variable	Selection Stage: Export Decision		Outcome Stage: Export Share	
	Coefficient	Standard Error	Coefficient	Robust Standard Error
Export costs	**-0.00**	0.00***	**-0.03**	0.01***
Age of firm	**-0.01**	0.00***	**-0.41**	0.11***
For. shareholding	0.12	0.11	2.61	4.78
Market share	**0.00**	0.00***	**0.16**	0.08*
Prior experience	0.14	0.09	3.66	4.32
Bribes	0.01	0.01	-0.08	0.38
Manuf. Sector	**0.37**	0.12***	-	-
Gov. regulations	-0.00	0.00	**0.26**	0.13*
ISO accreditation	**0.34**	0.11***	-	-
Firm size	0.00	0.00	-0.00	0.00
Network	0.06	0.09	-3.79	4.08
Constant	0.38	0.25	35.30	12.18**
Diagnostics				
No. of obs	889			
Censored obs	499			
Uncensored obs	390			
Wald χ^2	83.93***			
ρ	0.87			
λ	36.90**			

Note: Here ***, ** and * indicate significance at the 1%, 5% and 10 % levels respectively. Source: Authors' calculations.

The results contained in Table 8 indicate that the omission in the existing literature of export costs in the internationalization behavior of firms, and African firms in particular, is a weakness, given that export costs are found to be a significant and negative determinant of both the decision to export and the extent of exports – although the size of the coefficient is small. The impact of transport costs is larger on exports as a share of total sales than on the probability that the first will export in the first place. In both cases, though, transport (export) costs are negative and statistically significant at the 1 percent level. This means that we cannot reject hypothesis H1: export costs significantly lower the probability of export market entry by African firms and lower the extent of exports for those firms that do enter export markets.

As far as the control variables are concerned, it is interesting to note from Table 8 that having a larger domestic market share, being in the manufacturing sector, and having ISO accreditation positively influence the decision to initiate exports in African countries. The

former is also positively related to the extent of exporting, as is the time spent by the entrepreneur/manager on government regulations. This could, in the absence of clear evidence of causality, suggest that either a heavily regulated environment encourages firms to export more abroad, or that firms located in Africa tend to spend more time on government regulations, i.e., they are being more intensely monitored or regulated by government.

The results in Table 8 indicate that older firms are less likely to export in Africa, and export proportionately less when they do. This may suggest that exporting is more important for younger firms, i.e., it is tentative evidence in support of hypothesis H2. We test this further in the next sub-section.

6.3 Hypothesis H2

To test hypothesis H2, that young African firms are more likely to export despite facing various constraints, including high transport costs, we re-estimated the model of section 6.2, but with a dummy variable = 1 if an exporting firm started exporting when it was three years or younger. Three years is commonly used in the literature to define a international new venue (see Naudé and Rossouw 2010). As we explained in section 2, we may expect younger firms to be more export-oriented for the reasons mentioned.

The Heckman two-step results are contained in Table 9. Again, the significance of lambda suggests that it is appropriate to use a sample selection estimator.

Table 9. Heckman two-step regression results for African firms' decision to export and extent of exports with dummy variable included for firms that started exporting in their first three years

Variable	Selection Stage: Export Decision		Outcome Stage: Export Share	
	Coefficient	Standard Error	Coefficient	Robust Standard Error
Export costs	**-0.00**	0.00***	**-0.03**	0.01**
For. shareholding	0.04	0.11	-1.30	4.73
Market share	**0.00**	0.00***	**0.19**	0.08*
Prior experience	0.11	0.09	0.99	4.23
Bribes	0.00	0.01	-0.24	0.39
Manuf. sector	**0.37**	0.12***	-	-
Gov. regulations	-0.00	0.00	**0.27**	0.13*
ISO accreditation	**0.31**	0.11**	-	-
Firm size	0.00	0.00	-0.00	0.00
Network	0.07	0.09	-2.45	4.11
Young firm dummy	**0.91**	0.14***	**41.49**	8.63***
Constant	0.13	0.25	19.55	13.29
Diagnostics				
No. of obs	889			
Censored obs	499			
Uncensored obs	390			
Wald χ^2	113.86***			
ρ	0.91			
λ	39.36**			

Note: Here ***, ** and * indicate significance at the 1%, 5% and 10 % levels respectively. Source: Authors' calculations.

The results in Table 9 are broadly similar to those in Table 8 and again our main variable of interest in this paper, transport (export) costs, is significant in both the selection and outcome stages (although the size of the coefficient is small). We can see that the young firm dummy is highly significant at the 1 percent level in both stages, implying that young firms (three years of age or less) are more likely to start exporting and that firms that started exporting when young will have a higher export share of sales than older firms. This is in accordance with hypothesis H2.

To further investigate we ran a double Probit model (or biprobit) where both stages are selection stages, i.e., we model the decision to go global at a young age as first being dependent on the decision to go global. Thus, in the first stage firms or entrepreneurs will decide to export, and in the second stage they will decide whether or not to export before their

firm is three years old. Of course, in practice these decisions appear to be simultaneous, and our use of stages is merely a modeling strategy to avoid a potential sample selection bias, since many firms in the sample never select to export at all. Thus, if we had run a simple Probit model the dependent variable would have been equal to 1 if the entrepreneur made the decision to start exporting before his or her firm was three years of age and equal to 0 if the entrepreneur decided otherwise. However, amongst those with zero values would have been many firms that will never export, suggesting that the estimates may be biased because the decision on the age at which to start exporting is conditional on the desire or decision to export.

Using the same explanatory variables as in the previous cases, the double Probit model allows us to determine whether or not export costs have a significant impact on the speed of internationalization in African countries. In other words, we want to answer the question of whether or not high transport costs cause entrepreneurs to delay their internationalization plans. The results are contained in Table 10.

Table 10. Double probit regression results for the decision to start exporting early

Variable	Selection Stage 1: Export Decision		Selection Stage 2: Early Exporting	
	Coefficient	Standard Error	Coefficient	Robust Standard Error
Export cost	**-0.00**	0.00**	0.00	0.00
For. shareholding	0.21	0.14	-0.10	0.19
Market share	**0.01**	0.00***	**-0.01**	0.00***
Prior experience	**0.52**	0.12***	-0.43	0.17*
Bribes	0.00	0.02	0.22	0.13
Manuf. sector	-0.03	0.13	-	-
Gov. regulations	-0.00	0.00	-0.00	0.01
ISO accreditation	**0.41**	0.14***	-	-
Firm size	0.00	0.00	-0.00	0.00
Network	**0.35**	0.14**	**-0.54**	0.21**
Age of firm	**-0.01**	0.00***	**-**	-
Constant	-0.63	0.32*	1.59	0.48***
Diagnostics				
No. of obs	641			
Censored obs	499			
Uncensored obs	142			
Wald χ^2	33.06***			
ρ	-0.91*			

Note: Here ***, ** and * indicate significance at the 1%, 5%, and 10 % levels respectively. Source: Authors' calculations.

Table 10 shows that if we condition the timing decision, i.e., the discrete choice to export early (before the firm is three years old), on the decision to enter export markets, then export costs are not significant. Hence, transport costs seem to be significant in the decision to export (although the size of the coefficient is very small) and the extent of exporting, but not in the timing of exports. As such, transport costs do not appear, at least in the African sample, to discourage international new venues once the entrepreneur has made the decision to enter export markets. Interestingly, the results in Table 10 show that the size of a firm's national market share is negatively related to the timing decision. This implies that the larger a firm's national market share, the less likely it is to internationalize at an early age. However, as was found in Tables 8 and 9, the size of an African firm's national market share will eventually push it towards export markets. Similarly, networks seem to retard the speed with which firms in Africa go global; with substantial membership of business networks firms will start exporting later rather than sooner. This is consistent with empirical evidence from Naudé and Rossouw (2010) for China and Rooks et al. (2009) for Uganda.

7. Concluding remarks

We started this paper by noting that the international entrepreneurship literature has neglected the potential impact of transport costs on the international behavior of entrepreneurs, and that "new" new trade has somewhat neglected the speed with which many exporters start exporting after establishing their firm, and the extent of exports in their total sales. We discussed the fact that Africa, the world's poorest continent, faces particularly high export costs in international trade, and provided evidence to suggest that export costs faced by firms in Africa may be higher than those elsewhere. Given the importance of firm internationalization through exports for Africa's economic growth, we then proceeded to investigate the impact of export costs on the internationalization behavior of firms in Africa, using a large firm-level survey conducted by the World Bank.

Based on a literature survey we formulated two hypotheses: (i) Export costs significantly lowers the probability of export market entry by African firms and the subsequent extent of exports in their sales, and (ii) Young African firms (those three years old or younger) may be more likely to export despite facing various constraints, including higher export costs. Hence we can answer the question posed in the title of this paper in the affirmative: export costs do matter for whether, when and how much firms from Africa export.

We could not reject the formulated hypotheses. It was noticeable from the empirical data that firm internationalization, and the born global phenomenon, is significant in Africa. Internationalizing firms in Africa tend to have the following characteristics: they are young, they have an increasing national market share (meaning they are locally successful), they are in the manufacturing sector, they have ISO accreditation, and they spend considerable time dealing with government regulations. The significance of age in the exporting decision and extent of exports found in this paper contradicts the process model of internationalization (PMI) of Johanson and Vahlne, which posited that firms would only tend to export once they are older and more experienced.

Moreover, our empirical analyses found that export costs in US dollars are indeed a significant determinant in the decision of entrepreneurs to start exporting and of the extent of their exports. It is not, however, a significant determinant of the speed or timing of the internationalization decision of entrepreneurs in Africa, once they have decided to go global; then their networks and the entrepreneur's prior exporting experience becomes more important.

The policy implications of this paper encompass both obvious (or expected) and non-obvious (or non-expected) aspects. It is obvious and in line with prior anecdotal evidence that the high level of export costs faced by firms in Africa should be addressed. The Logistics Performance Index discussed in section 2 provides useful guidance in identifying the elements of trade and logistics that contribute to Africa's high export costs.

What is perhaps less obvious, or at least not expected in our results, is the fact that we did not find firm size or corruption (institutional weaknesses) to be significant deterrents to exporting in Africa. The implication is that the small size that characterizes firms in Africa may perhaps not be in itself such a significant obstacle to exporting as is often thought. Moreover, corruption (measured here by bribes paid) does not constrain entrepreneurs' internationalization behaviour. Consequently, policies to specifically help young, small manufacturing enterprises become more competitive, raise their product quality, and increase their domestic market share can be recommended based on the results of this paper. In addition, the role of networks and prior exporting experience need perhaps to be better understood. It is often supposed that policies to strengthen these areas will encourage exports. In this paper, however, we established that local business networks and prior export experience may delay the timing or speed of a firm's internationalization. As this may appear counterintuitive and as research on Chinese firms has found a similar result (Naudé 2009b), this area may warrant further study before more definite policy recommendations can be made in this regard.

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Appendix A

Summary Statistics of Variables Used

Variable	Number of Observations	Mean	Standard Deviation
Dependent variables			
Export (Yes =1, No=0)	5,694	0.35	0.48
Export share all (%)	5,694	17.89	34.19
Export share (only direct exporters) (%)	5,694	15.45	32.30
Early exporters (Yes = 1, No= 0)	1,280	0.55	0.50
Explanatory variables			
Export costs (US $ per container)	5,839	1,150	569,54
Firm age (years)	4,948	19.50	17.88
Firm size (number of employees)	5,749	152.89	606.23
Foreign shareholding (Yes = 1, No = 0)	5,801	0.15	0.36
National market share (%)	3,140	24.46	28.22
Prior experience of exporting (Yes = 1, No = 0)	2,317	0.41	0.50
Part of a network (Yes = 1, No = 0)	5,839	0.50	0.50
Bribes paid (as % of annual sales)	3,487	2.11	7.42
Government regulations (% of management time taken)	3,910	10.14	15.16
ISO certification (Yes = 1, No = 0)	4,578	0.13	0.34

Source: Authors' calculations

Abstract (in Japanese)

要約

アフリカ企業の輸出のスピードと規模に対して輸出費用が与える影響は何か？

この問いに答えるために、世銀が 2002-2003 年 71 カ国 49,584（主にフォーマル）企業（うち 5,839 がアフリカ 16 カ国の企業）に対して行った調査データを使用して分析した。

その結果、アフリカ企業は他の地域の企業に比べ、高い輸出費用に直面していることが分かった。

しかしながら、アフリカ企業は輸出市場に参入しやすいが、参入の際の輸出規模（総売り上げに占める輸出の割合）は、平均して他の地域に比べて小さい。

また、若い企業は古い企業に比べて輸出を始めやすい傾向にあることが判明した。

輸出費用の影響に関しては、輸出費用（米ドル計算）はアフリカ企業の輸出の可能性と規模を減少させるが、アフリカ企業の輸出開始後はその影響がないことが示された。