ESTUDIOS ECONÓMICOS
ISSN: 0425-368X
ISSN: 2525-1295
estudioseconomicos@uns.edu.ar
Universidad Nacional del Sur
Argentina

Brice, Adou Niango Sika Antoine; Socrates, Majune Kraido
EXPLORING THE DURATION OF EXPORTS: EVIDENCE FROM COTE D'IVOIRE°
ESTUDIOS ECONÓMICOS, vol. XXXIX, núm. 79, 2022, Julio-Diciembre, pp. 47-70
Universidad Nacional del Sur
Bahía Blanca, Argentina

EXPLORING THE DURATION OF EXPORTS: EVIDENCE FROM COTE D'IVOIRE°

DURACIÓN DE LAS EXPORTACIONES: EVIDENCIAS PARA COSTA DE MARFIL

*Adou Niango Sika Antoine Brice**
*Majune Kraido Socrates***

enviado: 22 octubre 2020 – *aceptado:* 11 marzo 2021

Abstract

This paper investigates the effect of urbanization on export duration in Cote d'Ivoire using HS 6-digit level bilateral export data between Cote d'Ivoire and 155 countries from 1996 to 2018. We found that the mean and median duration of exporting in Cote d'Ivoire are 1.8 years and 1 year, respectively. Using a discrete-time logit model with random effects, we established that urbanization in the importing country reduces survival of Ivorian exports, specifically, in Sub-Saharan Africa, and in low- and middle-income countries. Urbanization in Europe and Central Asia and in high-income countries improves survival of Ivorian exports, while the internal urbanization index has not contributed to maintain export duration.

Keywords: exports duration, discrete-time model, urbanization, product types, Cote d'Ivoire
JEL Codes: F14, C41, O55

° Brice, A.N.S.A., & Socrates, M.K. (2022).Exploring the duration of exports: evidence from Côte d'Ivoire. *Estudios económicos,* 39 (79), pp. 47-70. DOI. https://doi.org/10.52292/j.estudecon.2022.2233

* Faculty of Economics and Management, University of Felix Houphouet Boigny, Cote d'Ivoire. ORCID: https://orcid.org/0000-0002-2895-9534. Email: brice.ansab@gmail.com

** Department of Economics and Development Studies, University of Nairobi, Kenya. ORCID: https//orcid.org/0000-0002-4740-7284. Email: skmajune@uonbi.ac.ke

Resumen

Se investiga el efecto de la urbanización en la duración de las exportaciones en Costa de Marfil utilizando datos de exportaciones bilaterales entre este país y 155 países a nivel de 6 dígitos del HS. Se concluye que la duración media y mediana de las exportaciones en Costa de Marfil son 1,8 años y 1 año, respectivamente. Utilizando un modelo logit de tiempo discreto con efectos aleatorios, se estableció que la urbanización en el país importador reduce la supervivencia de las exportaciones marfileñas, específicamente, en África subsahariana y en países de ingresos bajos y medianos. La urbanización en Europa y Asia central y en los países de ingresos altos mejora la supervivencia de las exportaciones de Costa de Marfil, mientras que el índice de urbanización interna no ha contribuido a mantener la duración de las exportaciones.

Palabras clave: duración de las exportaciones, modelo de tiempo discreto, urbanización, tipos de productos, Costa de Marfil
Código JEL: F14, C41, O55

INTRODUCTION

Why and how international trade occurs has been a concern for some time. It has been explained through traditional theories (Absolute Advantage, Comparative advantage, and Heckscher-Ohlin), New Trade theories (Krugman, 1979; 1980), and New New Trade theories, which are based on firms (Bernard & Jensen, 1995; 1999). Thanks to the growing availability of data, the empirical discourse has recently shifted from countries to firms. For instance, it is now known that exporters are larger, more skill and capital intensive, and pay higher wages than non-exporters (Bernard et al., 2012; Melitz & Redding, 2014, Wagner, 2016; Castellani, Damijan, & Kostevc, 2020). Nonetheless, answers to how long trade relationships last and what determines their duration are contemporary and few.

The length of trade relationships is short-lived, as established by both macro-based (Besedeš & Prusa, 2006a, 2006b; Nitsch, 2009; Fugazza & Molina, 2016) and firm-based studies (Sabuhoro et al., 2006; Békés & Muraközy, 2012; Zhu, Liu, & Wei, 2019). Yet, as a matter of policy, it is important to improve export duration so as to raise levels of long-run export growth and deepen existing trade relationships. Most countries and firms make more sales from trading with existing partners and selling existing products than trading with new partners and selling new products (Besedeš & Prusa, 2011). The case of existing products and partners is known as the intensive margin, while the case of new partners and new products is the extensive margin (Besedeš & Prusa, 2011). The intensive margin is related to export duration/survival as the latter tracks the likelihood of a country/firm exporting a current product to an existing market over time (Besedeš & Prusa, 2011). Thus, identifying factors that cause higher duration rates may help policy makers improve the export perfomance of their countries. Generally, most countries prioritize export growth to achieve economic prosperity (Ossa, 2015).

In this paper, we contribute to the discussion of trade duration in two ways. First, we explore the link between trade and agglomeration economics by assessing the effect of urbanization on export survival. To our knowledge, this relationship has only been assessed by Arguello, Garcia-Suaza and Valderrama (2020) using Colombian firm-level data. Other studies have linked export survival to real GDP, common border, common language, distance, colonial history and trade agreements, market access costs, institutions, corruption, political risk, and exchange rate volatility (Kamuganga, 2012; Gullstrand & Persson, 2015; Carrère & Strauss-Kahn, 2017; Majune, Moyi, & Kamau, 2020).

The theoretical intuition of relating export survival to agglomeration economics is from the core-periphery model in which manufacturing activities take place in the "core," where there is a large market, while agricultural activities occur in the "periphery" (Krugman, 1991). This configuration helps to reduce transport cost, to find appropriate workers as well as to benefit from vertical and horizontal linkages. Therefore, export activities and productivity increase in the core because of consumers' love of variety and a larger market to serve. Cities have become more important in the formation of the core, and even crucial for the pattern of trade (Glaeser, 2010). Countries with a sustainable core tend to be productive and export/import more products.

Second, we expand studies on export survival in Sub-Saharan Africa (SSA). Our study is based on Cote d'Ivoire, which is among the top ten exporters from the SSA region, but has struggled to boost its export performance. Exports have often grown by less than 5% and the rate has deteriorated in recent times. Given that the country pursues an export-led hypothesis, our study informs policy on how to boost survival of existing exports. Most studies on exports in Cote d'Ivoire focus on the exports-economic growth nexus (Abdulai & Jaquet, 2002; Keho, 2015) or on export from a particular sector (Amoro & Shen, 2012).

We analyzed discrete-time probit and logit survival models using export relationships between Cote d'Ivoire and 155 countries over the period 1996-2018. Our data traces product-destination-year relationships at the 6-digit harmonized system level. We found that urbanization in the foreign country decreases survival rates of exports from Cote d'Ivoire.

The remainder of the paper is organized as follows. Section 1 presents an overview of the relevant empirical literature. Section 2 describes data and preliminary results. Section 3 on the empirical methodology and results, while section 4 concludes the study.

I. LITERATURE REVIEW

A strand of literature on export survival has emerged following the seminal work of Besedeš and Prusa (2006a, 2006b). The authors applied the Cox Proportional hazard model on US import data and concluded that exports to the US market die early. In addition, exports of homogenous products tend to have a shorter survival period in the US than those of heterogeneous products. The volume of exports, at the beginning of a spell, is essential for prolonged survival of a trade

relationship. Similar results have been found by Besedeš (2008) in the USA, Nitsch (2009) in Germany, and Brenton, Saborowski, and von Uexkull (2010) in developing countries.

Subsequent studies have analyzed discrete-time models, such as probit and logit, after Hess and Persson (2012) concluded that discrete-time models are better at predicting export survival than continuous-time models, such as the Cox Proportional hazard model. For instance, Türkcan and Saygılı (2018) applied a probit model with random effects to study the impact of trade agreements on export survival in Turkey. Türkcan and Saygili (2020) used the same model to assess the impact of Global Production Chains on export survival. The authors found that market diversification has a lower effect on the survival rate than product diversification. Economic factors such as export value are associated with a lower probability of failing, while the real exchange rate increases the failure rate. Moreover, trade costs reduce survival, but having a common language and border boost it significantly.

Carrère and Strauss-Kahn (2017) found that export experience is critical to export survival in the Organisation for Economic Co-operation and Development (OECD) market. A country with prior knowledge of exporting outside OECD has a high probability of surviving in the OECD market. Furthermore, a partner that starts exporting in nearby markets and expands to other destinations over time has more experience and is likely to survive for a long time in the OECD markets. In the same vein, Lawless, Siedschlag, and Studnicka (2019) find that, for Irish firms, experience matters strongly when such an exporter is engaged in product diversification.

According to Fugazza and Molina (2016), differentiated goods are associated with a high export survival rate than homogenous goods. Further, despite competition in homogenous goods markets, developing countries enjoy some comparative advantages and longer duration of spells in those products. Zhu, Liu, and Wei (2019) used Chinese data to assess survival of firms when they participate in global value chains. Participating in the universal chain value increases export survival, but the effect is robust for firms exporting heterogeneous goods. Such goods are well integrated into the international market and enjoy a longer duration.

Pradhan and Das (2016) analyzed the duration of manufacturing exports in India by inserting region-specific variables in their analysis. The results show that the median trade duration differs by areas where firms are located. By applying discrete-time models, the authors concluded that firms located in a high-income per capita regions have a lower survival rate. This is attributed to a more diversified

and sophisticated consumption behavior. In addition, areas with big local markets increase a firm's export survival rate.

A few studies have researched the export duration in Africa. For instance, Kinuthia (2014), Chacha and Edwards (2017), and Majune et al. (2020) in Kenya; Banda and Simumba (2013) in Zambia; Lemessa, Watabaji, and Yismaw (2018) and Abegaz and Lahiri (2019) in Ethiopia; and Mohammed (2018) in Ghana. Kamuganga (2012) examined the effects of intra-regional trade cooperation on export survival within Africa and to the rest of the world.

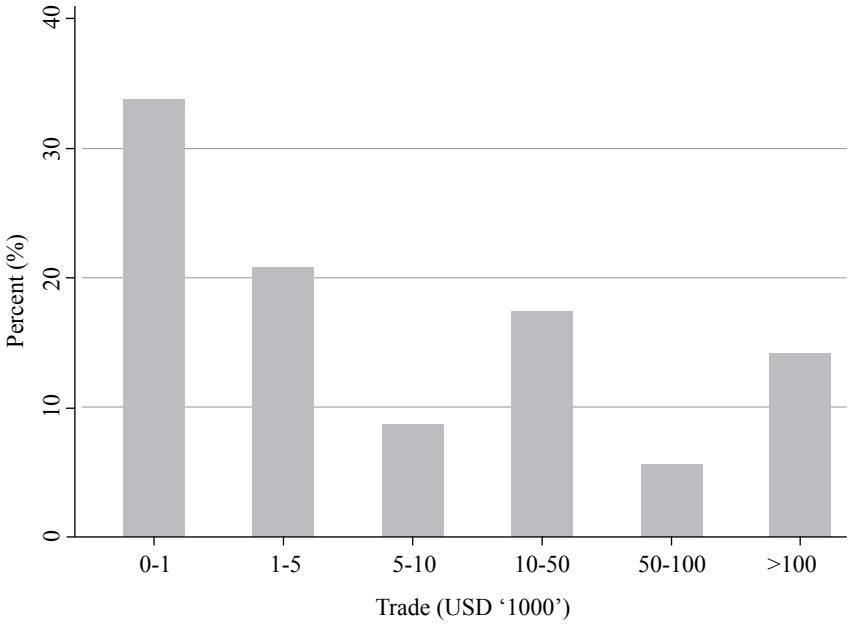
II. DATA AND PRELIMINARY RESULTS

This study used annual country-product-destination data from the UN Comtrade Database on exports from Cote d'Ivoire over the period 1996 to 2018. The data is at the 6-digit level classification of the Harmonized System (HS). Import records of destination countries were used instead of exporter's records because they are more reliable, especially in developing countries (Brenton et al., 2010). Data for other variables is from several sources. Institutions were created using the Principal Component Analysis based on the worldwide governance indicator database (Kaufmann, Kraay, & Mastruzzi, 2011). Many variables were obtained from the World Development Indicators database, while gravity variables were taken from the CEP11 database. A detailed definition of variables used is provided in the appendix.

We used a sample of 155 import countries of Ivorian products. We made the following modifications to arrive at this number. First, we eliminated countries that have very few numbers of trade relationships with Cote d'Ivoire over the study period. Then, we excluded all importers that miss data for distance, as it is an essential variable in the analysis. We then remained with 5,000 products exported each year on average.

Figure 1 displays the distribution of export values from Cote d'Ivoire over our study period. About 33% of exports are less than US$ 1,000 followed by those whose value is between US$ 1,000 and US$ 5,000. Overall, slightly less than a half of exports from Ivory Coast are over US$ 5,000. About 14% of exports are above US$ 100,000. This proves that Cote d'Ivoire is among the top exporters in SSA region, since most countries from SSA export less than US$ 100,000 worth of products (Kamuganga, 2012).

Figure 1. Distribution of Export Values from Cote d'Ivoire



Source: own elaboration.

Next, we described the distribution of spells in Cote d'Ivoire. A spell is the length of time (in years for our case) a product is exported to a specific destination nonstop. Our study had a total of 125,033 trade relationships in the period of study. Out of this, about 55% of them lasted for a single year, as shown in Table 1. Nearly 15% of them lasted for two years. Cumulatively, at least 70% of export relationships from Cote d'Ivoire lasted for two years. This indicates that most trade relationships died by the second year. The failure rate was high such that roughly 5% of trade relationships lasted for more than a decade.

We elaborated this through Kaplan-Meier graphs. We found that about 31% of exports survive beyond the first year of trading (see Figure 2). Conversely, this result suggests that close to 70% of exports fail in the first year of trading. This rate is higher than that of Kenya, where between 20% and 60% of exports die within the first year of trading (Kinuthia, 2014; Majune et al., 2020). It is also higher than the African average, which is 65% (Kamuganga, 2012), suggesting that Cote d'Ivoire could be performing poorly in terms of export survival compared to most

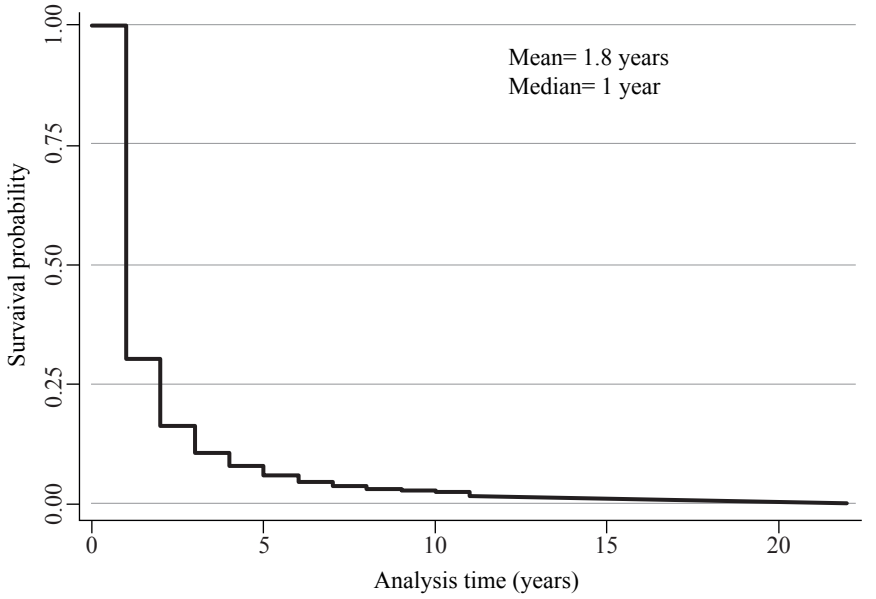
developing countries. At most, 17% of Ivorian exports survive to the second year of trading and less than 10% live beyond the third year of trading. Roughly, about 1% of exports remain active for the entire period of study. The overall mean and median duration in Cote d'Ivoire are 1.8 years and 1 year, respectively.

Table 1. Description of Spells

Spell length (years)	Number of spells	Percent of spell	Cumulative
1	69064	55.24	55.24
2	18698	14.95	70.19
3	9659	7.73	77.92
4	5916	4.73	82.65
5	4266	3.41	86.06
6	3249	2.60	88.66
7	2438	1.95	90.61
8	1957	1.57	92.17
9	1576	1.26	93.43
10	1349	1.08	94.51
11	1176	0.94	95.45
12	839	0.67	96.12
13	746	0.60	96.72
14	650	0.52	97.24
15	585	0.47	97.71
16	516	0.41	98.12
17	463	0.37	98.49
18	431	0.34	98.84
19	380	0.30	99.14
20	317	0.25	99.39
21	292	0.23	99.63
22	255	0.20	99.83
23	211	0.17	100.00

Source: own elaboration.

Figure 2. Kaplan-Meier Survival for all Exports

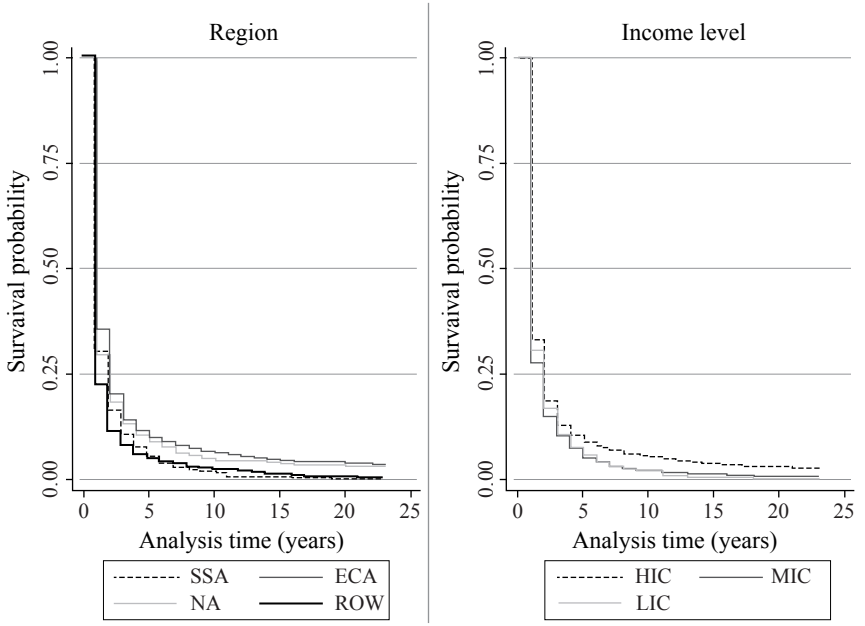


Source: own elaboration.

Figure 3 portrays export survival by region and income level. The right-hand side graph shows that export survival is the highest in European and Central Asian markets for the entire period of study. This could be attributed to the colonial relationship with France, which is among the top importers of Ivorian commodities. Whereas the Sub-Saharan African market is the second highest in terms of first-year export survival, it loses its position to North America and the Rest of the World after less than a decade. Therefore, export experience in North America and the Rest of the World improves survival. Furthermore, survival in North America matches that of Europe and Central Asia after around 18 years of trading. This implies that non-reciprocal preferential trade agreements, such as AGOA (African Growth and Opportunities Act), which is between the USA and African countries, boost survival over time.

The left-hand side figure shows that survival is the highest in high-income countries possibly due to the high demand from being large markets. There is no significant difference in survival for low- and middle-income countries.

Figure 3. Survival Function by Region and Income Level



Note. ECA = Europe and Central Asia, SSA = Sub-Saharan Africa, ROW = Rest of the World, HIC = High-Income Countries, MIC = Middle-Income Countries, and LIC = Low-Income Countries.
Source: own elaboration.

III. METHODOLOGY AND RESULTS

III.1. Empirical Specification

We applied a discrete-time model in our study. The advantages of such models over continuous-time models have been explained by Hess and Persson (2011, 2012). They can efficiently deal with ties in duration, control for unobserved heterogeneity, and do not assume a proportional hazard, meaning that the

assumption of the hazard rate depending on the covariate and constant overtime is not made.

Following Türkcan and Erkuş-Öztürk (2020), we defined the event of stopping exporting to a particular market as a failure. Let T describe the time for a trade relationship, with T as a discrete random variable. The survival function is expressed as:

$$S(t) = (T > t) = \sum_{t_i>1} p(t_i) \quad [1]$$

Then, the probability for a trade relationship to continue between times [t, t+1], given that a failure has not happened since the starting point of time, is defined as the hazard probability. This conditional probability is written as follow:

$$H_i(t, X) = Pr(T_i < t_{i+1} | T_i > t_m) = 1 - exp\{-exp(\beta' X \quad + \gamma_t)\} \quad [2]$$

Where X is a set of time-varying variables that are assumed to influence the hazard rate; γ is the baseline hazard rate for the t th interval that allows the hazard rate to vary over time; β is a vector of coefficients to be estimated. A negative (positive) sign of the coefficient means a lower (higher) probability of failure and, therefore, a higher (lower) probability of trade exports survival.

We incorporated a set of dummy variables to account for the duration intervals of each spell, since the underlying baseline hazard is unknown. Empirically, a Gaussian error term is introduced as a random-effects indicator that deals with the problem of unobserved heterogeneity (frailty). Concretely, region and year fixed effects are also included to control for endogeneity problems. We estimated the discrete-time proportional hazard model by maximizing the following log-likelihood function:

$$lnL = \sum_{i=1}^{i} \sum_{t=1}^{t_i} [y \quad ln(h \quad) + (1 - y \quad) ln(1 - h \quad)] \quad [3]$$

Where t_i is the final period and the underscore i refers to an individual trade relationship, it varies with the country's survival spell. y is the binary dependent variable, which takes the value one if the failure occurs for a country i at year t and zero, otherwise. A positive (negative) coefficient indicates that a particular explanatory variable reduces (increases) the survival of the spell.

Equation [2] is specified as a logit model and, in turn, its log-likelihood function in Equation 3 is logistic. However, alternative discrete-time models, such as complementary log-log (henceforth, clog log) and probit model, can be used. We overcame the problem of left censoring by excluding trading relations in 1996, which is our first year of trading. The main reason is the lack of clarification on whether the trade relationship began in 1996 or earlier. The last year of trading, 2018, is the right censoring. It is included as it has been done by studies, such as Zhu et al. (2019). Multiple spells are included as a dummy. These are trade relationships that lapsed and recurred after some time. The data of product at the 4-digit level of classification is used for robustness checks. Table A.1 and Table A.2 in the appendix indicate the definition of our variables and descriptive statistics, respectively.

III.2. Empirical Results

To study factors that influence export duration in Cote d'Ivoire, we used a discrete-time logit model. A Hausman test was first conducted to establish the appropriate model between fixed and random effects. The result recommended the random effects model. The first column in Table 2 presents baseline results of the overall survival rate. The second to fifth columns display results by region, while the last three columns show results by level of income. In each specification, the dependent variable is the hazard rate.

Urbanization, which is our variable of interest and represented here by agglomeration, significantly improves overall export survival as shown in the first column. Therefore, growth in the urban population of importers increases the probability of Ivorian exports to continue. Especially in countries located in Europe or Central Asia, agglomeration does affect positively the survival rate. However, results show that, for countries in Sub-Saharan Africa or low-income ones, agglomeration in urban areas does not contribute to sustain export relationships with Ivorian firms. One possible reason is the fact that Cote d'Ivoire mostly exports the same type of products like these countries. Unless for re-exporting purposes, it will be difficult to witness permanent spells between these countries. Moreover, these products tend to have low chances of substitutability. Urbanization improves export duration in both high- and middle-income countries. This implies that exporting to these markets is likely to be beneficial. That confirmed that agglomeration impacts exports' survival differently in Cote d'Ivoire. The positive effect in Europe and Central Asia, and among high-income countries, means that these regions have achieved a level in which urbanization helps them to increase their export in the

manufacturing sector and need long-term trade relationships in the primary industry. That result is in line with Thia (2016).

Further, we considered internal agglomeration countries and the exporter size in term of GDP. We concluded that the Ivorian population has not contributed sufficiently to sustain its own exports duration. That is expressed also in the country statistics, which recently show a preference for cities, with more people leaving the rural area. In almost all specifications, the exporter's GDP displays positive and significant coefficients. Only for exports toward low-income countries and to the rest of the world, that variable seems to matter.

Product differentiation is expressed in terms of homogenous products and heterogeneous ones following Rauch (1999) classification. One characteristic of homogenous products is that they are composed of by-products, such as agricultural products and oil. Heterogeneous goods exports have a positive effect on the hazard rate in all models, meaning that they reduces trade duration. Conversely, homogenous products significantly increase survival of exports across all models (geographical regions and income groups). This is attributed to the fact that the country is an exporter of agricultural products to many destinations. In addition, policies have succeeded in sustaining agricultural exports in international markets, but consistent reforms have failed to improve the value addition of manufacturing products. The primary sector employs more than 50 percent of the population, accounts for 25 percent of the GDP, and 60 percent of the export revenue (World Bank, 2018). Many of such products have been classified as homogenous, which are long-lived in the global chain value, as noticed by Chacha and Edwards (2017). However, such a contribution of product differentiation is common to all income levels and regions.

When we consider exports toward high-income countries, the exchange rate, tariffs, financial development index, and heterogeneous goods increase the risk of failure. The exchange rate volatility has harmed the survival rate, which also reflects how the country is highly vulnerable to international shocks. Distance or substantial costs involved in trading with those countries are found less efficient for export survival. However, institutions in those countries increase trade survival. The clarity of rules and institutions in the international market makes it easy for the importers to continue or stop a trade relationship.

Table 2. Estimation Results with a Logit Model

VARIABLES	ALL	ECA	NA	SSA	ROW	HI	MI	LI
DISTANCE	0.01**	-0.001***	0.04	0.001***	0.001***	0.001***	-0.001	0.001***
	(0.001)	(0.001)	(0.033)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP PARTNER	-0.06***	-0.13***	-0.01	0.06***	-0.11***	-0.12***	-0.07***	0.18***
	(0.009)	(0.027)	(0.053)	(0.011)	(0.024)	(0.020)	(0.016)	(0.015)
FIN_DEV	0.001	0.001***	-0.001	-0.001***	0.001***	0.001	-0.001***	0.001**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.001)	(0.001)	(0.001)	(0.001)
INSTITUTIONS	0.04***	0.10***	0.18	0.26***	0.01	-0.03*	0.23***	0.21***
	(0.009)	(0.015)	(0.254)	(0.023)	(0.021)	(0.020)	(0.024)	(0.031)
EXCHANGE RATE	0.07***	0.03***	0.06	-0.31***	-0.06*	0.02***	-0.19***	-0.06
	(0.006)	(0.007)	(0.050)	(0.037)	(0.037)	(0.006)	(0.031)	(0.074)
AGGLOMERATION	-0.02*	-0.24***	26.04	0.21***	-0.03	-0.06***	-0.15***	0.47***
	(0.014)	(0.089)	(17.563)	(0.030)	(0.021)	(0.018)	(0.046)	(0.042)
TARIFFS	-0.001***	0.001	-0.01**	-0.01***	0.001	0.001	-0.001***	0.001*

	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.0001)	(0.001)
AGGLO_EXPORTER	0.94***	-1.06**	-2.79	3.62***	5.25***	-0.75*	0.16	5.52***
	(0.230)	(0.429)	(2.400)	(0.330)	(0.817)	(0.399)	(0.534)	(0.394)
GDP_EXPORTER	0.53***	0.57***	0.62	0.14	-1.41***	0.44**	1.41***	-0.53***
	(0.104)	(0.200)	(0.577)	(0.145)	(0.371)	(0.185)	(0.240)	(0.172)
HOMOGENEOUS	-0.54***	-0.39***	-0.44*	-0.52***	-0.78***	-0.36***	-0.76***	-0.54***
	(0.052)	(0.071)	(0.247)	(0.092)	(0.135)	(0.070)	(0.104)	(0.112)
HETEROGENEOUS	0.11***	0.14***	0.09	0.07***	0.12***	0.14***	0.13***	0.03
	(0.012)	(0.017)	(0.060)	(0.018)	(0.037)	(0.016)	(0.024)	(0.023)
COMMON_LANG	-0.11***	-0.20***	-	0.33***	0.04	-0.17***	-0.15**	0.34***
	(0.029)	(0.056)		(0.054)	(0.105)	(0.041)	(0.067)	(0.102)
COLONY	-0.23***	-0.23***	-	-	-	-0.23***	-	-
	(0.054)	(0.062)				(0.056)		
CONTIGUITY	0.03	-	-	-0.25***	-	-	-0.82***	0.01
	(0.035)			(0.051)			(0.092)	(0.064)

LANDLOCKED	0.05	-0.13**	-	0.79***	0.93**	0.03	0.02	0.71***
	(0.035)	(0.056)		(0.071)	(0.473)	(0.050)	(0.159)	(0.089)
CONSTANT	-26.03***	7.49***	-462.97	-58.95***	-47.89***	4.02*	-30.88***	-77.97**
	(1.499)	(2.471)	(322.382)	(2.377)	(5.151)	(2.329)	(3.491)	(2.975)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Partners dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spells dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	96,895	28,703	3,985	53,507	10,581	33,863	24,825	37,795
No. of products	37,178	11,405	1,524	18,622	5,659	14,122	10,888	12,009
Log-Likelihood	-55498.90	-16539.24	-2127.34	-30751.79	-5021.61	-19148.19	-13377.07	-21541.74

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10
SSA = Sub-Saharan Africa, ECA = Europe and Central Europe, NA = North America, ROW = Rest of the World, HI = High Income, MI = Middle Income, and LI = Low Income.
Source: own elaboration.

As regards to European and Asian countries, findings show that country size, measured by their GDP, increases export duration. As found in many trade duration studies, GDP is a crucial determinant of export survival (Zhu et al., 2019). That effect is the same when countries share a colonial relationship. As far as financial development is concerned, that factor does not contribute to the trade relationship duration between Cote d'Ivoire and some of its partners. It could mean that credit in the private sector does not trigger investment to establish a long-term trade relationship with the country. Being landlocked is also a decisive factor in maintaining the relationship.

The literature related to trade economics asserts that trade among African countries is low. The main explanation stems from the fact that exports are oriented to other parts of the world. We deal with the specific case of Sub-Saharan economies. Among these countries, the ones with common official language establish a strong export relationship. The high magnitude reveals that the connections are stronger even if infrastructures default in many African countries. Financial development and tariffs increase the survival rate. It is a positive signal for African countries that are involved in many trade agreements. Moreover, being a neighboring country to Cote d'Ivoire reduces survival mainly because exports are oriented to other regions with a different currency.

III.3 Robustness analysis

One particularity of the data is that they are collected in a quite high level of disaggregation (HS 6-digit). In this section, we investigated whether the findings are robust by using HS 4-digit level data. Results are presented under columns (1) and (2) of Table 3. In Model 1, we show results when exports are oriented uniquely to Sub-Saharan Africa economies, while Model 2 is the baseline model. Results in both models (1 and 2) do not differ with our findings in Table 1.

Table 3. Robustness Checks Results

	SSA	ALL	SSA	ALL
VARIABLES	(1)	(2)	(3)	(4)
DISTANCE	-44.59***	0.001	-30.651	-0.01
	(7.359)	(0.002)	(4.45)	(0.014)
GDP	-0.036***	-0.08***	-0.01	-0.04***
	(0.013)	(0.011)	(0.007)	(0.006)
FINANCIAL DEVELOPMENT	-0.001*** (0.000)	-0.001** (0.000)	-0.001** (0.000)	-0.001** (0.000)
INSTITUTIONS	0.50***	0.31***	0.224***	0.04***
	(0.038)	(0.029)	(0.021)	(0.006)
EXCHANGE RATE	-0.46***	0.07***	-0.399***	0.05***
	(0.049)	(0.013)	(0.028)	(0.004)
AGGLOMERATION	0.17*** (0.021)	0.10*** (0.017)	0.10*** (0.012)	0.08*** (0.007)
TARIFFS	-0.001***	-0.001**	-0.001***	-0.001***
	(0.000)	(0.000)	(0.001)	(0.000)
COMMON LANGUAGE	-80.59*** (13.448)	1.38 (2.923)	-55.18*** (8.084)	-0.10*** (0.017)
CONTIGUITY	-1.20***	2.82*	-0.631***	0.01
	(0.256)	(8.265)	(0.144)	(0.025)
COLONY		-2.82***	-	-
		(2.892)		
PRODUCT TYPE	-	-	0.10***	0.17***
			(0.024)	(0.016)
LANDLOCKED	-	-	-	0.05***
				(0.019)
CONSTANT	383.08***	-0.88	262.54***	0.92***
	(62.300)	(13.147)	(37.139)	(0.139)

year dummies	yes	Yes	Yes	Yes
time dummies	yes	Yes	Yes	Yes
partners dummies	yes	Yes	Yes	Yes
spells dummies	yes	Yes	Yes	Yes
observations	36.914	36.500	53.489	96.578
no. of products	9.375	9.358	18,604	36,862
log-likelihood	-39369.4	-20692.9	29609.6	-20595.1

Note. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10
Source: own elaboration.

The second robustness analysis involves the use of a probit model with 6-digit level data. Findings are presented in Models 3 and 4 in Table 3. In this design, results from the baseline specification are the preferred ones. Product type affects the probability of exports to live. When we consider whether the importing country is landlocked or not, we conclude that being landlocked is potentially damageable for the life of Ivorian exports. Financial development and economic market size (GDP) increase the export's survival rate. In summary, it appears that the findings are robust across different samples and specifications made.

CONCLUSION

This paper sought to establish the effect of agglomeration on export duration in Cote d'Ivoire. Bilateral HS 6-digit data between Cote d'Ivoire and 155 partner countries from 1996 to 2018 was used. A discrete-time logit model with random effects was applied for the baseline results, while a discrete-time probit model with random effects was analyzed for robustness check.

We establish that the mean and median duration of Ivorian exports is 1.8 years and 1 year, respectively. Almost 70% of exports die within the first year of trading and less than 10% of all trade relationships survive to the third year. Survival is the highest in European and Central Asia markets. Moreover, in high-income countries, experience improves survival in North American markets and in the Rest of the World. Equally, survival in low- and middle-income countries is identical.

Logit regression results indicate that urban population (urbanization), which is used to proxy agglomeration, generally reduces survival of Ivorian exports. The

effect is severe in Sub-Saharan Africa, and low- and middle-income countries. Nevertheless, the effect is positive in Europe and Central Asia, and in high-income countries. When we distinguish between internal and external agglomeration, we conclude that the urbanization rate in Cote d'Ivoire has not allowed trade with partners to remain consistent. This could express the lack of source for increasing return to scale for firms established in the urban area.

In terms of policy recommendation, we note that it is important for Ivorian policy makers to enhance strategies that increase survival of Ivorian exports. Some of the interventions towards this end include creating an enabling environment for Foreign Direct Investment, facilitating trade, joining trade agreements, improving transport and logistics infrastructure, among others. Increasing interactions and championing for better terms of trading should be enhanced with European and Central Asian, and high-income partners.

REFERENCES

Abdulai, A., & Jacquet, P. (2002). Exports and economic growth: Cointegration and causality evidence for Cote d'Ivoire. *African Development Review*, *14*(1), 1-17.

Abegaz, M., & Lahiri, S. (2019). Entry and survival in the export market: Spillovers from foreign and outward-looking domestic firms in Ethiopia. *The European Journal of Development Research*, *32*(4), 847–872.

Amoro, G., & Shen, Y. (2013). The determinants of agricultural export: Cocoa and rubber in Cote d'Ivoire. *International Journal of Economics and Finance*, *5*(1), 228-233.

Arguello, R., Garcia-Suaza, A., & Valderrama, D. (2020). Exporters' agglomeration and the survival of export flows: Empirical evidence from Colombia. *Review of World Economics*, *156*(3), 703-729.

Banda, B., & Simumba, J. (2013). *The Birth, Death and Survival of Exports in Zambia, 1999-2011. (Working Paper No.12).* Lusaka, Zambia: Zambia Institute for Policy Analysis & Research.

Békés, G., & Muraközy, B. (2012). Temporary trade and heterogeneous firms. *Journal of International Economics*, *87*(2), 232-246.

Bernard, A. B., & Jensen, J. B. (1995). Exporters, jobs, and wages in US manufacturing: 1976-1987. *Brookings Papers on Economic Activity. Microeconomics*, 67-119. doi:10.2307/2534772

Bernard, A. B., & Jensen, J. B. (1999). Exceptional exporter performance: Cause, effect, or both? *Journal of International Economics*, *47*(1), 1-25.

Bernard, A., Jensen, J., Redding, S., & Schott, P. (2012). The empirics of firm heterogeneity and international trade. *Annual Review of Economics*, *4*(1), 283–313.

Besedeš, T. (2008). A search cost perspective on formation and duration of trade. *Review of International Economics*, *16*(5), 835–849.

Besedeš, T., & Prusa, T. (2006a). Ins, outs, and the duration of trade. *The Canadian Journal of Economics*, *39*(1), 266-295.

Besedeš, T., & Prusa, T. J. (2006b). Product differentiation and duration of US import trade. *Journal of International Economics*, *70*(2), 339–358. doi: 10.1016 / j.jinteco.2005.12.005

Besedeš, T., & Prusa, T. J. (2011). The role of extensive and intensive margins and export growth. *Journal of Development Economics*, *96*(2), 371-379.

Brenton, P., Saborowski, C., & Uexkull, v. E. (2010). What explains the low survival rate of developing country export flows? *The World Bank Economic Review*, *24*(3), 474–499.

Carrère, C., & Strauss-Kahn, V. (2017). Export survival and the dynamics of experience. *Review of World Economics*, *153*(2), 271-300.

Castellani, D., Damijan, J., & Kostevc, Č. (2020). What makes a successful exporter? An introduction. *The World Economy*, *43*(5), 1148-1150.

Chacha, P. W., & Edwards, L. (2017). *The Growth Dynamics of New Export Entrants in Kenya: A Survival Analysis.* (ERSA, Working Paper No. 712). Southern Africa: Economic Research Southern Africa.

ESSO, L. J. (2006). Comment rédiger les bibliographies. *Adventure WorksMonthly*, 50-65.

Fugazza, M., & Molina, C. A. (2016). On the determinants of exports survival. *Canadian Journal of Development Studies*, *37*(2), 159-177.

Glaeser, E. L. (2010). *Agglomeration Economics.* Chicago: University of Chicago Press.

Gullstrand, J., & Persson, M. (2015). How to combine high sunk costs of exporting and low export survival. *Review of World Economics*, *151*(1), 23–51.

Hess, W., & Persson, M. (2011). Exploring the duration of EU imports. *Review of World Economics*, *147*(4),665–692.

Hess, W., & Persson, M. (2012). The duration of trade revisited. *Empirical Economics*, *43*(3), 1083-1107.

Kamuganga, D. N. (2012). *Does Intra-Africa Regional Trade Cooperation Enhance Africa's Export Survival?*. (Working Paper No. 16). Geneva: Graduate Institute of International and Development Studies.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2011). The worldwide governance indicators: Methodology and analytical issues. *Hague Journal on the Rule of Law*, *3*(2), 220-246.

Keho, Y. (2015). Foreign direct investment, exports and economic growth: Some African evidence. *Journal of Applied Economics and Business Research*, *5*(4), 209-219.

Klepper, S., & Thompson, P. (2006). Submarkets and the evolution of market structure. *The RAND Journal of Economics*, *37*(4), 861-886.

Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, *99*(3), 483-499.

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics*, *9*(4), 469-479.

Krugman, P. R. (1980). Scale economies, product differentiation, and the pattern of trade. *American Economic Review*, *70*(5), 950-959.

Lawless, M., Siedschlag, I., & Studnicka, Z. (2019). Firm strategies in expanding and diversifying exports. *The World Economy*, *42*(2), 349-375.

Lemessa, S. D., Watabaji, M. D., & Yismaw, M. A. (2018). The analysis of entry of Ethiopian enterprises into the export-markets and the associated factors: The duration approach. *Journal of Small Business and Enterprise Development*, *25*(2), 241-255.

Majune, S. K., Moyi, E., & Kamau, G. J. (2020). Explaining export duration in Kenya. *South African Journal of Economics*, *88*(2), 204-224.

Melitz, M. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, *71*(6), 1695-1725.

Melitz, M. J., & Ottaviano, G. I. (2008). Market size, trade, and productivity. *The Review of Economic Studies*, *75*(1), 295-316.

Melitz, M., & Redding, S. (2014). Heterogeneous firms and trade. In G. Gopinath, E. Helpman, & K. Rogoff, *Handbook of International Economics* (pp. 1-54). New York: Elsevier.

Mohammed, A.-R. A. (2018). Determinants of export survival: The case of Ghanaian manufacturers. *Journal of Quantitative Methods*, *2*(1), 37-61.

Ossa, R. (2015). Why trade matters after all. *Journal of International Economics*, *97*(2), 266-277.

Pradhan, J. P., & Das, K. (2016). Regional profile of export duration of firms. In J. P. Pradhan, & K. Das, *Manufacturing Exports from Indian States: Determinants and Policy Imperatives* (pp. 107-129). New Delhi: Springer India.

Rauch, J. (1999). Networks versus markets in international trade. *Journal of International Economics*, *48*(1),7-35.

Sabuhoro, J. B., Larue, B., & Gervais, Y. (2006). Factors determining the success or failure of Canadian establishments on foreign markets: A survival analysis approach. *The International Trade Journal*, *20*(1), 33-73.

Thia, J. P. (2016). Trade and urbanisation. *The World Economy*, *39*(6), 853-872.

Türkcan, K., & Erkuş-Öztürk, H. (2020). The impact of economic and political crises on the survival of tourism-related firms: Evidence from Antalya. *Tourism Economics*, *26*(7), 1152-1174.

Türkcan, K., & Saygili, H. (2018). Economic integration agreements and the survival of exports. *Journal of Economic Integration*, *33*(1),1046-1095.

Türkcan, K., & Saygili, H. (2019). Global production chains and export survival. *Eastern European Economics*, *57*(2), 103-129.

Wagner, J. (2016). A survey of empirical studies using transaction level data on exports and imports. *Review of World Economics*, *152*(1), 215-225.

Zhu, X., Liu, B., & Wei, Q. (2019). Does participation in global value chains extend export duration? *Review of Development Economics*, *23*(3), 1282-1308.

APPENDIX

Table A.1. Variable Description and Source of Data

Variable	Description	Sources
Distance	Log of simple distance between the exporter and partner capitals.	CEPII database
Contiguity	Dummy, 1 for contiguity and 0, otherwise.	CEPII database
Common language	Dummy, 1 if the partner has the same common official language.	CEPII database
Financial development	Percentage of domestic credit to the private sector.	World Development Indicators
Colony	Dummy, 1 if pairs ever in a colonial relationship and 0, otherwise.	CEPII database
Tariffs	Tariffs rates in the importer country.	World Development Indicators
Product type	Products differentiation based on Rauch (1999) classification.	Own computation
Agglomeration	Urban population as a percentage of the total population in the partner country.	World Development Indicators
GDP partner	Log of real GDP of the partner country.	World Development Indicators

Institutions	A computed variable from principal component analysis.	World Development Indicators
Exchange rate	Real exchange rate.	World Development Indicators
Landlocked	Dummy, 1 if the country is landlocked and 0, otherwise.	CEPII database
Population Density	Population density of the partner country.	World Development Indicators
Agglo_ Exporter	Urban population as a percentage of the total population in the exporter country: Cote d'Ivoire.	World Development Indicators
GDP_Exporter	Log of real GDP of the exporter country: Cote d'Ivoire.	World Development Indicators

Table A.2. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Multiple spells	115432	1.688	1.024	1	20
GDP Exporter	115380	3.616	4.296	-4.387	10.707
Initial Value	114392	365.644	5953.148	0	366964
Spells	114392	62140.304	36249.459	1	125567
Agglo_Exporter	115380	46.695	2.61	41.964	50.779
Agglomeration	113901	7.222	.942	0	8.146
GDP Partner	113901	7.126	1.128	0	8.124
Institutions	94975	0	1	-1.577	1.527