Heliyon 9 (2023) e12723

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Research article

Economic integration and survival of Ghana's manufactured and agriculture raw material exports

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ARTICLE INFO

Keywords:
Export survival
Economic integration agreements
Manufactured products
Agriculture raw materials
Ghana

ABSTRACT

The paper investigates the effects of economic integration agreements on the survival of Ghana's manufactured and agriculture raw material exports. Using annual trade data for Ghanaian manufactured and agriculture raw material product exports from 1988 to 2018 and a discrete-time proportional hazard model, we found that economic integration agreements enhance the survival of manufactured products and agriculture raw material exports. The Non-Reciprocal Preferential Trade Agreement is the most survival-enhancing. In addition, economic integration agreements strengthen the survival of existing active export relations but decrease the survival of export relations initiated after the agreement was signed. We also found that the average duration of manufactured products and agriculture raw material exports is 9.041 and 8.817 years, respectively. The study recommends that the Ministry of Trade and Industry should continue negotiating for Non-Reciprocal Trade Agreements.

1. Introduction

Firms will always want to remain competitive, expand and grow. In pursuit of these objectives, firms engage in exports [1]. Economic integration agreements (EIAs) have become a major channel through which firms enter the export market. Available evidence indicates that EIAs reduce trade costs and competition and increase exports [2,3]. The literature has been extended to look at the effect of EIAs on the survival of export firms [4–7].

Empirical evidence has shown that EIAs are essential in determining export survival rates. Martuscelli and Varela [8] argued that EIAs boost the chances of survival of export relations by lowering policy-related trade costs, providing more information about destination markets, and reducing competition. As a result, lower trade costs and limits on competition from nations outside the agreement can help stabilize trade relations, thus, significantly boosting the chance of survival in export markets [9].

But has this been the case for Ghana? For several decades, the government of Ghana has entered into various EIAs, for example, the Economic Partnership Agreement (EPA) with the EU and the African, Caribbean, and Pacific (ACP) countries, the African continental free trade area (AfCFTA) agreement, the Economic Community of West African States (ECOWAS), and African Growth and Opportunity Act (AGOA), with the motive of lowering or eliminating policy-imposed barriers to trade and opening new opportunities for domestic firms. Thus, Ghanaian exporters have had preferential access to many markets [10]. For example, in 2019, the United States, Burkina Faso, and Germany were among Ghana's top five export destinations [11]. Yet the exporting firms have not demonstrated

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https://doi.org/10.1016/j.heliyon.2022.e12723
Received 11 May 2022; Received in revised form 26 July 2022; Accepted 21 December 2022
Available online 30 December 2022

individual resilience in maintaining their export relationships for agricultural raw materials and manufactured products beyond a few years of service. For instance, a survey by the Regional Programme on Enterprise Development in 1998 revealed low export survival rates for Ghanaian manufacturing firms.

Similarly, Mohammed [12] revealed that Ghanaian manufacturing firms suffer from high failure rates in the international markets, with the median duration being 5–6 years. Recently, Boakye et al. [11] revealed that the total number of exporting firms in Ghana fell from over 3000 in 2013 to 1110 in 2019 due mainly to exporters exiting the export market. Surprisingly, the United States and Burkina Faso had the highest firm exits in 2019.

This development implies that even though EIAs have significantly led to the creation of new export relationships, the sustainability of such export relationships, especially those involving agricultural raw materials and manufactured product exports, has not been impressive reflecting weaknesses in our particular preferences/agreements or due to other factors. Hence, this prompts the question of whether Ghana's association with any of the regional and multinational agreements plays any significant role in the survival chances of our exports to these countries, and if they do, which particular types of agreements are more survival-enhancing?

The paper is motivated by the fact that the manufacturing and agricultural sectors are leading Ghana's strategy of export transformation through diversification and integration into global value chains (GVC) within the AfCFTA and the Global economy as a whole to engender economic growth, decent jobs and poverty alleviation in Ghana [13]. Given the fact that Ghana has signed many economic integration agreements and yet has a high attrition rate of exports on the international market as highlighted by Ref. [11]; this study offers a golden opportunity to explore how the numerous EIAs, particularly AfCFTA can be leveraged on, in terms of policy making, to achieve the export transformation agenda. It is worth noting that the realisation of this goal necessitates not only firm penetration into export markets or the formation of new export relationships but also the survival and subsequent expansion of these newly formed export relationships. Incipient export-survival literature in Ghana has not captured the crucial role of various EIAs that Ghana is a signatory to in determining the country's exports' survival rate [12,14]. We contribute to the existing literature in several ways: First, Mohammed [12] did not consider the possible effects of EIAs on export survival. While Nkansah et al. [14] analyzed this effect, the study's scope was limited to only the role of ECOWAS in influencing export survival. In contrast, Ghana is a signatory to several EIAs, and EIAs' design, institutional quality, and legal enforceability vary. As such, conceptual variations between EIAs may affect international trade and economic outcomes differently. Therefore, this paper contributes to the existing literature by establishing the role of EIAs (Non-Reciprocal Preferential Trade Agreements, Preferential Trade Agreements, Customs Unions) in the survival rates of exports of agricultural raw materials and manufactured products while also ascertaining which types of agreement (s) are more survival-enhancing. Thus, the paper set out to achieve three main objectives: First, to estimate the effects of EIAs on the survival rate of exports of agricultural raw materials and manufactured products in Ghana. Second, the paper sought to determine which of the EIAs was export survival-enhancing. Third, the paper also sought to determine the average duration of exports across the two products.

The paper's findings indicate that EIAs promote agriculture raw materials and manufactured products exports with the Non-Reciprocal Preferential Trade Agreement as the most survival-enhancing in Ghana. Furthermore, the findings reveal a mean duration of 9.041 years for manufactured products and 8.817 years for agriculture raw material exports.

The rest of the paper is structured as follows. Section 2 summarises the review of the literature. The third section examines the data and the primary variables used in the study. The methodology is discussed in Section 4. Section 5 summarises the econometric findings, while Section 6 brings the paper to a conclusion.

2. Literature review

The study is conceived within Marc J. Melitz's Heterogenous Firm Model. Melitz [1] posits that the introduction of firms to international trade reduces cost, intensifies competition, and results in the survival of the more productive firm while the less profitable firm exits. The less efficient firm's exit bestows the surviving firm a larger market share and profit.

Globally, a number of firm-level studies on export survival have been done, and the results show that the duration of export relations is short. Wu and Fu (2014) used data on Chinese manufacturing firms from 1998 to 2007 to examine the trends and causes of export survival. They found that exporters had a very high chance of leaving at the start of the exporting time. The study also found that large, productive, and export-oriented firms tend to export for a long time. In addition, they found that foreign ownership is a good predictor of export survival, but state ownership makes it more likely that exports will fail in international markets.

Similarly, Chacha and Edwards [15] examined the entry and growth patterns of new exporters in international markets and the determinants associated with survival in foreign markets for Kenya. Employing the Cox proportional hazard model, the study found that only a small number of firms can survive beyond the initial year of entry. The study further found that firm attributes such as high start-up value of trade, differentiated products, exporting a large volume of products, and serving a broad number of destination markets contribute significantly to exporters' survival in the international market.

Contrary to these results, Gebreyesus and Gebregergs [16] found that Ethiopian exporting firms have a higher survival rate, with more than 50% of firms surviving in the export market. Gebreyesus and Gebregergs [16] further found that large and medium-sized firms that are highly productive, export-oriented, and private-owned have a better chance of staying in export markets than the rest.

Another strand of the literature considers the effects of EIAs on export firm survival. For example, Recalde et al. [17] analyzed the impact of economic integration on trade survival, initial trade volumes, and export growth in Latin America. They used a random-effects logit model and found that, albeit slightly, EIAs boost trade survival rates. The study also indicated that higher-quality agreements lead to higher trade relationship survival rates. The study further found that signing an economic integration agreement boosts growth rates, but this effect decreases with time. The results show that EIAs enhance the survival of spells that began before the

agreement was signed but decrease the survival rate after the agreement was signed. The study also found that initial export values were relatively small for countries with an EIA. In another study, Hayakawa and Kimura [2] found that trade agreements are associated with lower tariff rates for manufacturing products. Similarly, Pomfret and Sourdin [3] concluded that regionalization reduces the trade costs of East Asian countries.

Relatedly, Turkcan and Saygili [4] used a discrete-time probit model with random effects to examine how various EIAs between Turkey and its trading partners affect machinery exports. The study breaks down machinery into parts and components and finished goods and examines the effects of EIAs on each type of good. The study found that EIAs enhance the survival of pre-agreement export relationships. The study also found that the benefits vary by product, with the effect more significant for parts and components exports than for finished product exports. Turkcan and Saygili [4] concluded that preferential trade agreements (PTAs) and non-reciprocal preferential trade agreements (NR-PTAs) increased the survival of exports of parts and components more than free-trade areas (FTAs). Similarly, Türkcan et al. [18] used customs transactions level data to analyze the impact of average tariffs on the survival of

Table 1
Variable definition, measurement, expected sign, and source of data.

Variable (Symbol)	Definition	Measurement	Expected Sign	Data Source
Hazard rate	Proxy for export survival	Measures the likelihood of an export relationship failing against the likelihood of it surviving. That is the incidence rate with which an export relationship exits a market after some t number of years.		WITS, SITC- Revision 2
Economic integration agreement Exist (EIA Exist)	The dummy variable defines the pairs of countries that Ghana has an economic integration agreement with at some point (NR-PTA, PTA, CUSTOMS).	It takes the value of one if an EIA exists and zero if otherwise.	Negative	Baier and Jeff Bergstrand database on EIAs, WTO's RTA-IS database.
Economic integration in effect (EIA in effect)	Dummy variable that defines the years during which an agreement is in place.	It takes the value of one if Ghana had an agreement with an importing country in a given calendar year and zero otherwise.	Negative	Baier and Jeff Bergstrand database on EIAs, WTO's RTA-IS database.
Spell starts after EIA	The dummy variable captures export spells that started after an agreement was signed.	It takes the value of one if an export spell started after an agreement was signed and zero if otherwise.	Positive/ Negative	Baier and Jeff Bergstrand database on EIAs, WTO's RTA-IS database.
Distance ($DistCap_{ij}$)	It is the geographical distance between the importer's capital and Accra. Delivering a product to a destination market takes longer and costs more money because of the distance. As a result, the longer the shipment's journey, the higher the likelihood of disruptions or delays, which might result in the cancellation of subsequent orders.	In kilometres	Positive	Centre d'Etudes Prospectives et d'Informationales (CEPII)
GDP of the importer ($GDPIM_{ij}$)	GDP of the importing country. It is used as a proxy to measure the thickness of destination markets and the (foreign) market's potential.	Measured in US dollars	Negative	World Bank's World Development Indicators (WDI)
Landlocked (L_{ij})	Dummy variable that defines if the importing country is landlocked or otherwise.	Dummy variable that assumes the value of 1 if the importing country is landlocked and 0 if otherwise.	Positive	Centre d'Etudes Prospectives et d'Informationales (CEPII)
Initial Export Value (IEV_{ij})	Value of export at the start of an export spell or relation. Initial export value is a proxy for ex-ante trust between trade partners.	Measured in US Dollars	Negative	World Integrated Trade Solutions (WITS)
Common Language (CL_{ij})	Dummy variable that defines if Ghana shares a common official language with a trading partner.	It takes the value of 1 if Ghana shares a common official language with a trading partner and 0 if otherwise.	Negative	Centre d'Etudes Prospectives et d'Informationales (CEPII)
Common Border (CB_{ij})	Dummy variable that defines if Ghana shares a common Border with an importing country.	Assumes the value of one if Ghana shares a common Border with an importing country and zero if otherwise.	Negative	Centre d'Etudes Prospectives et d'Informationales (CEPII)
Years of export experience (YE_{ij})	It is a proxy that measures the number of active years that Ghana has been in an export relationship with a country.	In years	Negative	World Integrated Trade Solutions (WITS)
Population Pop_{ij}	This variable denotes the population of importing countries. We use the population as a proxy for the economic size of the importing country	In millions	Negative/ Positive	World Development Indicators (WDI)
Colonial ties (col_{ij})	Dummy variable that defines if any of Ghana's trading partners is a former colony of Britain or otherwise.	It takes the value of one if any of Ghana's trading partners is a former colony of Britain and zeroes if otherwise.	Negative	Centre d'Etudes Prospectives et d'Informationales (CEPII)

Source: Authors' construct (2022).

firms in Kenya. They found that a 1% increase in tariffs reduces export survival by 2.7%. This implies that lowering tariffs, possibly through trade agreements, can assist firms and countries in improving their export performance. In a cross-country study, Kamuganga [6,5] examined the effects of integration agreements on the survival of 53 African countries' trade relations from 1995 to 2009. He discovered that EIAs improve the survivability of exports across all types of agreements.

Furthermore, Besedes et al. [7] looked at how EIAs influence trade value at the start of a new trade relationship, the longevity of trade relations, and the rate at which trade grows within a relationship. Employing annual trade data at the 5-digit SITC level for over 180 countries from 1962 to 2005, they discovered that economic integration fosters the duration and growth of trade relations that began before the commencement of the agreement while decreasing the duration and growth of those that started after the agreement, as well as their initial transaction value. In the same study, Besedes et al. [7] found that economic integration leads to additional export flows into international markets.

Although there is extensive research on the impact of EIA on export survival on a global scale, there are very few studies in Ghana. Nkansah et al. [14] analyzed the effect of regional integration – the Economic Community of West African States (ECOWAS) – on the survival rate of Ghana's exports. Using a discrete-time complementary log-log hazard model, they found that ECOWAS improves the survival rate of Ghana's exports. Mohammed [12] also did a survival analysis to determine factors affecting Ghanaian manufacturing exporters' survival. He found that the median time they were in business was 5–6 years. More than that, exporting a finished product lowers the chances of survival in export markets, but the company's age, size, and volume of exports increase the chances of survival.

A couple of gaps have been found in the existing literature. A considerable number of the cited literature have been done outside Ghana [4,7,15–19]. Therefore, their findings and recommendations cannot be adopted because of country differences. In Refs. [6,5] study, Ghana's role in the study appears to have been absorbed by the information of other countries. As a result, it distorts the detailed picture that would otherwise engender useful discussions and inform EIAs and export-related policy strategies in Ghana.

Moreover, Mohammed [12] did not consider the possible effects of EIAs on export survival. While [14] examined this effect, their study was limited to the role of ECOWAS on export survival. This study fills these gaps in the existing literature in two ways. First, the study will provide the first evidence on the effects of various EIAs on the survival of agriculture raw materials and manufactured product exports from Ghana while also finding which agreement is more survival-enhancing. Second, the paper determines the average duration of export relationships across agriculture raw materials and manufactured products.

3. Methodology

3.1. Data

The study employed panel data with a sample span from 1988 to 2018. A detailed description of the variables and the sources are presented in Table 1.

3.2. Theoretical framework

The theoretical foundation of the relationship between a firm's survival in the export market and economic integration agreement is established in the heterogeneous firm model of Melitz [1] and presented in Ref. [14]. The theory posits that economic integration agreements (EIAs) remove trade barriers and reduce costs. The ensuing competition between firms leads to the more efficient firms surviving while the less profitable firms exit the export market. Following [14]; we express the relationship between economic integration agreements and the probability of a firm exiting from the export market as

$$h_{it} = f(EIA_i, x_{it}) \tag{1}$$

From Eq. (1), h_{it} represents the likelihood that an export relation will fail to exist, which depends on the economic integration agreement (EIA) as well as other predictors of international trade, x_{it}.

3.3. Empirical model specification

Following [20]; the paper adopted the complementary log-log model, the discrete-time counterpart of the continuous-time cox proportional hazards model, to capture the unique characteristics of the dataset. This method estimates the baseline hazard. The cloglog model also works well with right-censored data and time-varying variables. The latter, combined with control for unobserved individual heterogeneity, assists in determining the effects of survival time on export duration. The paper also employed a non-parametric approach (Kaplan-Meier) to assess the variations in hazard rates (or survival rates) among the various economic integration agreements for each product-country pairing in both sectors.

3.3.1. Discrete-time proportional hazard model

Like [20]; this paper adopts a discrete-time proportional hazard model with random effects. Duration (time) is considered a discrete variable in this context, not because it is naturally discrete but because data is available yearly (interval-censored data). Thus, our dataset contains one-year time intervals, and as such, the interval boundaries are positive integers $j = 1, 2, 3, 4, \ldots,$ and the interval j is $(j-1, j)$. An export spell or relationship may be complete $(ci = 1)$ or right censored $(ci = 0)$.

Therefore, a censored export spell/relationship i with a duration j interval adds to the likelihood function with the discrete-time

survivor function (the likelihood of surviving until the end of the interval j) to derive:

$$S_i(j) = \Pr(T_i > j) = \prod_{k=1}^{j}(1 - h_{ik}) \tag{2}$$

From Eq. (2), $T_i = min\{T_i^*, C_i^*\}$, where T_i^* is the latent failure time whereas C_i^* is the latent censoring time for the spell i.

Furthermore, from Eq. (2), the discrete hazard ratio (h_{ik}) which is the probability of ending an export spell/relation in interval k conditional on surviving up to the start of this interval is given as;

$$h_{ik} = Pr(k-1 < T_i \leq k | T_i > k-1) \tag{3}$$

Inferring from Eq. (3), a positive (negative) sign of the coefficients suggests a higher (lower) probability of ending an export relationship and, as a result, a lower (higher) likelihood of surviving in the export market.

Further, the likelihood contribution for a complete spell i in the j interval is given by the discrete-time density function (the likelihood of the spell ending within the j) as:

$$f_i(j) = \Pr(j-1 < T_i \leq j) = S(j-1) - S(j) = \frac{h_{ij}}{1 - h_{ij}} \prod_{k=1}^{j}(1 - h_{ik}) \tag{4}$$

Thus, using Eqs. (2) and (4), the log-likelihood function for the entire sample of export spells can be specified as follows:

$$Log\ L = \sum_{i=1}^{n} c_i\ log\left(\frac{h_{ij}}{1 - h_{ij}}\right) + \sum_{i=1}^{n}\sum_{k=1}^{j}\log(1 - h_{ik}) \tag{5}$$

According to Refs. [21–22]; we can rewrite Eq. (5) as the log-likelihood function of a binary dependent variable y_{ik} which assumes a value of 1 if an export spell i ends in year k, and 0 if otherwise, as follows:

$$Log\ L = \sum_{i=1}^{n}\sum_{k=1}^{j}[y_{ik}\ log\ h_{ik} + (1 - y_{ik})\log(1 - h_{ik})] \tag{6}$$

Equation (6) is the standard likelihood function for a binary regression model with a dependent variable of y_{ik}. The terminal time is donated by k_i and the subscript i indicates that it varies with the spell. Equation (6) allows for estimating the discrete-time hazard model using binary dependent variable approaches and incorporating time-varying covariates.

Now, assuming that h_{ik} is distributed as a complementary log-log (cloglog), the discrete-time version of the continuous-time proportional hazard model can be specified as follows:

$$cloglog\left[1 - h_j(x_{ij})\right] \equiv \log\left(-log\left[1 - h_j(x_{ij})\right]\right) = \beta_0 + x_{ij}\beta + \gamma_j$$

$$\Rightarrow h_j(x_{ij}) = 1 - exp\left[-exp(\beta_0 + x_{ij}\beta + \gamma_j)\right] \tag{7}$$

From Eq. (7), x_{ik} is a vector of time-varying variables that affect the hazard rate, and β is a vector of coefficients to be estimated. γ_k is a function of a time interval that permits the hazard rate to vary over time. From Eq. (7), the study incorporated unobserved heterogeneity into the cloglog model to yield:

$$h_{ij}(x_{ij}) = 1 - exp\left[-\exp(\beta_0 + x_{ij}\beta + \gamma_j + u_i\right] \tag{8}$$

From Eq. (8), $u_i = ln\ v_i$ and v_i multiplicatively enters the proportional hazard model such that $h(t, x_{it}) = h_0(t)exp^{\beta_0 + x_{it}}v_i$. The study further assumes that v is a Gamma distribution with a unit mean and variance σ^2 which will be estimated from the data.

According to Ref. [23]; failure to account for unobserved heterogeneity in the dataset may result in an underestimation of the actual proportionate response of the hazard to a change in the regressors, as well as an over-estimation (under-estimation) of the degree of negative (positive) duration dependence in the hazard.

The above specification is a complementary log-log regression equation with hazard rate as the dependent variable of an export relationship is obtained as follows:

$$h_{ij} = \beta_0 + \beta_1 EIAs_{ij} + \beta_2 DistCap_{ij} + \beta_3 GDPIM_{ij} + \beta_4 L_{ij} + \beta_5\ IEV_{ij} + \beta_6 CL_{ij} + \beta_7 CB_{ij} + \beta_8 YE_{ij} + \beta_9 Pop_{ij} + \beta_{10} Col_{ij} + u_{ij} \tag{9}$$

From Eq. (9), h_{ij} represents the hazard rate of an export spell/relationship ceasing. $EIAs_{ij}$ represents the economic integration agreements Ghana has with importing countries. $DistCap_{ij}$ represents the distance between Ghana's capital city and that of importing countries. $GDPIM_{ij}$ represents the GDP of the importing countries. L_{ij} indicates if importing countries are landlocked or not. The variable IEV_{ij} shows the initial export value of an export spell or relationship whereas CL_{ij} represents a common official language. The variable CB_{ij} indicates importing countries that Ghana shares a common geographical border, whereas YE_{ij} denotes the years of export experience. Pop_{ij} denotes the population of importing countries while Col_{ij} represents colonial history or ties between Ghana and importing countries.

4. Results and discussion

The results of the paper are presented and discussed in this section. There are two sub-sections. The first sub-section includes detailed statistics on Ghana's trade relations with its trading partners and the Kaplan Meier estimator's results (Non-Parametric Approach). The following section examines the empirical estimation results (Parametric Approach).

4.1. Descriptive summary

The summary statistics present information on the number of export partners across the two sectors from 1988 to 2018. It also shows relevant information on the distribution of export spells across manufactured products and agriculture raw materials. Table 2 reports the number of export partners (countries) across the two sectors from 1988 to 2018, broken down by the type of agreement.

Table 2 shows that from 1988 to 2018, Ghana exported agriculture raw materials to 148 countries. Of these, the country has had a trade agreement with 52 countries, constituting only 35% of the total number of trade partners. Over the same period, Ghana has had a customs agreement with 14 countries, an NR-PTA agreement with 38, and a PTA agreement with 27 countries. Likewise, the country exported manufactured products to 175 countries within the same period. Of these, the country had an agreement with 52, constituting only 30% of the total number of trade partners. Ghana had a customs agreement with 13 countries, an NR-PTA with 38 countries, and a PTA agreement with 27 countries.

4.2. Export survival of manufactured products

In this section, the paper presents distinctive characteristics of export spells of manufactured products, the patterns, and differences in survival rates across the three economic integration agreements. Table 3 shows the duration of export spells/relations, the export relation/spell breaks, and the number of export spells/relations for manufactured products.

Table 3 shows that the average duration or length of an export spell, regardless of whether Ghana has or doesn't have an EIA with an export partner, is 9.041 years. This result implies that, on average, manufactured product exports only last for 9.041 years in international export markets. Given the sample period, which is 30 years, the average duration of 9.041 years is very low and points to the high risk of failure of export relationships for manufactured products. This has negative implications for sustainable export expansion, diversification, and growth. This finding is consistent with the results of [6,5]. He found that African countries' average duration of export spells for non-traditional exports was very low. He mentioned that the continent's inability to grow and diversify its exports could be attributed to the short-lived trade spells in the manufacturing sector.

However, to clearly understand export survival in the manufacturing sector, we need to differentiate and account for the survival rate across export partners with an EIA and those without an EIA. This is necessary because economic integration agreements are claimed to nurture and improve the survival of export relations. Hence, we expect the average duration for trade agreement partners to be higher than that of non-agreement partners. Indeed, evidence from the table suggests that the average time or length of an export spell to trade agreement partners is substantially longer than to non-trade agreement countries. The average duration of export spells for agreement partners is 11.25 years, while the average duration of export spells for non-agreement partners is 7.38 years. This result indicates that export flows to trade agreement partners are less likely to fail and have a better chance of surviving than export flows to other partners who do not have a trade agreement with Ghana.

It is important to note that, even within the agreement partner group, survival rates may not be uniform across the three types of EIAs. Knowing which types of agreements are more survival-enhancing is essential. From the table, NR-PTA had the longest average length of an export spell, with an average spell length of 10.18 years. This success can be attributed to Ghana's substantial and longstanding trading ties with countries in the NR-PTA group. This finding is also consistent with that of [24]. They found that NR-PTAs, especially AGOA, increased Kenya's export survival.

In terms of the number of breaks in export relationships, the results show that the mean number of breaks in export relationships is 1.87 for manufactured products. Considering agreement and non-agreement partners, the results in the table show that the mean breaks are higher for non-trade agreement partners than for trade agreement partners. This indicates higher failure rates of export spells in non-trade agreement partners' export markets. Within the agreement partners group, the customs agreement had the largest

Table 2
Export partners (countries) across the two sectors.

	Agriculture Raw Materials		Manufactured Products	
	Number of Trade Partners	Percentage of Trade Partners	Number of Trade Partners	Percentage of Trade Partners
No Agreement	96	65%	123	70%
Agreement Exist	52	35%	52	30%
Customs	14	–	13	–
NR-PTA	38	–	38	–
PTA	27	–	27	–
Total	148	100%	175	100%

Note: In some cases, Ghana had more than one trade agreement with a country.
Source: Authors' construct (2022).

Table 3
Characteristics of export spells for manufactured products.

	Manufactured Products								
	Duration of export relation/spell (In Years)			The number of breaks in export relation/spell.			Number of export relations/spells		
	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum
With/without agreement	1	9.041	30	0	1.87	8	1	2.6	9
No Agreement	1	7.38	30	0	2.28	8	1	3	9
Agreement Exist	1	11.25	30	0	1	5	1	2	6
Customs	1	7.89	24	0	1.3	3	1	2.23	4
NR-PTA	1	10.18	30	0	0.35	3	1	1.3	4
PTA	1	5.20	10	0	0.32	2	1	1.14	2

Source: Authors' construct (2022).

mean number of breaks, showing exporters' incapacity to continue their export relations in the export markets of countries in this agreement bloc for longer periods. Despite the existing subregion's trade liberalization measures, we might attribute this finding to the hurdles and constraints on the free flow of products and services within the ECOWAS sub-region. For example, in 2003, the Nigerian government prohibited the importation of many manufactured products from Ghana (pharmaceuticals, aluminium products, rubber and plastic, and so on). This action damaged several domestic exporters and hampered exports to the ECOWAS sub-regions' primary market for Ghanaian products.

Regarding the number of spells, results from the table suggest that the mean number of spells for manufactured products is 2.6. The number of export spells counts how often Ghana re-entered an export partnership after a break or failure. When there are no agreements, the mean number of spells is 3, and 2 when there is an agreement, indicating that breaks or failures in export relations are more likely when Ghana exports to non-trade agreement partners. For the types of EIAs, customs agreements again had the largest mean number of spells.

Fig. 1 shows export survival probabilities for manufactured products across trade agreement and non-trade agreement partners. The y-axis represents likelihood and the x-axis trade survival/duration.

The graph is a series of decreasing steps that depict the decreasing hazard rate (or increasing survivability) as export spells age. According to the survival curves, Ghana's exports to trade agreement partners and non-trade agreement countries have drastically differing survival rates. It demonstrates, in particular, that exports to trade agreement partners are more likely to survive than exports to non-trade agreement countries.

Fig. 2 presents the export survival probability of manufactured products across the types of agreements. The figure depicts individual Kaplan-Meier survival curves for the three types of agreements. NR-PTA has a relatively higher survival rate, whereas PTA exhibits lower survival rates among the three types of agreements.

4.3. *Export survival of agriculture raw materials*

Agriculture raw materials and primary products have dominated Ghana's exports to its major trade partners. Despite this, Sraha's [25] evidence shows that agriculture raw material exporters suffer considerably more limitations than other commodity exporters.

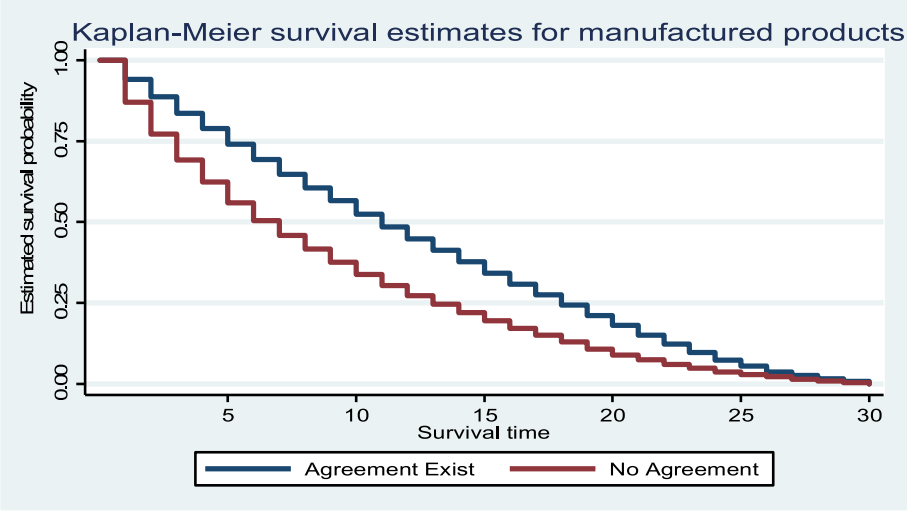

Fig. 1. Export Survival estimates for manufactured products.
Source: Authors' construct (2022).

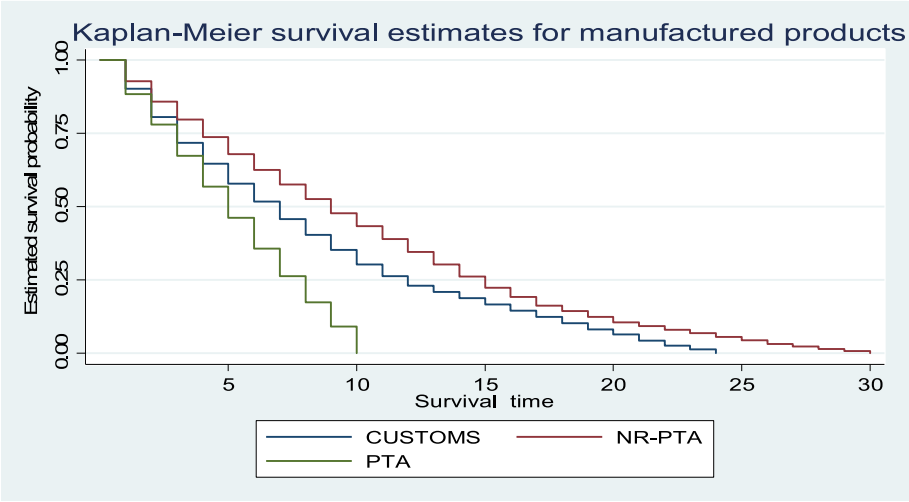

Fig. 2. Export survival estimates for agriculture raw materials by the type of EIA.
Source: Authors' construct (2022).

This development has resulted in the frequent entry and exit of agriculture raw material exporters from global markets. The study employs tables and survival graphs in this section to investigate the characteristics of agriculture raw material export spells and the trends and differences in survival rates among the three economic integration agreements.

According to Table 4, the mean duration of an export spell for agriculture raw materials is 8.817 years. This result follows that regardless of whether Ghana has or doesn't have EIA with an export partner, exports of agriculture raw materials only survive in export markets for 8.817 years, which is very low. This finding indicates that export relationships of agriculture raw materials are short-lived and have a high incidence of failure. According to Ref. [12]; exporters of agricultural products face more problems in Ghana than exporters of manufactured products. And this is because agricultural products need to be changed to meet the needs of foreign markets, and distribution networks need to be set up to meet the needs of customers in foreign markets, which increases the cost of re-entry for agricultural firms and stops them from exporting.

Considering exports of agriculture raw materials to the trade agreement and non-trade agreement export partners, evidence from Table 4 suggests that exports to trade agreement partners last longer than exports to non-agreement partners. This result means that exports to trade partners have a lower risk of failure and are more survival-enhancing than exports to non-trade agreement partners. This finding supports the claim that EIAs prolong the survival of export relationships by lowering trade-related transaction costs and other trade costs, enhancing the stability of export spells. As already noted, EIAs' effects on survival may not be uniform. Hence, there is a need to account for the survival rate across the three types of EIAs. The table shows that NR-PTA had the longest average export spells of all EIA categories. Again, NR-PTA is beneficial because it has exposed exporters from Ghana to large and dynamic markets such as the USA, Japan, Russia, and Canada over the years.

Consequently, regarding the number of breaks in export relationships, the mean number of export breaks was 1.82. This result implies that, on average, export relationships for agriculture raw materials break 1.82 times. Also, non-trade agreement partners have a greater mean number of export breaks, indicating a higher chance of export spell failure in non-trade agreement partners' export markets. Similar to the results in Table 3, customs have a larger mean of breakdowns in export relations, showing higher failure rates of agriculture raw material export spells/relations to nations within this agreement bloc.

In terms of the number of export spells, the mean number of export spells for agriculture raw materials was 2.48. This result proves that, on average, export spells for agriculture raw materials fail and restart 2.48 times. When there are no agreements, the average

Table 4
Characteristics of export spells for agricultural raw materials.

	Agriculture Raw Materials								
	Duration of export relation/spell			The number of breaks in export relation/spell.			Number of export relations/spells		
	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum
With/without agreement	1	8.817	30	0	1.82	5	1	2.48	6
No Agreement	1	7.06	30	0	2.10	5	1	2.67	6
Agreement Exist	1	10.50	30	0	1.30	5	1	2.09	6
Customs	1	7.79	24	0	1.28	3	1	2.14	4
NR-PTA	1	9.03	30	0	0.65	5	1	1.44	5
PTA	1	4.93	10	0	0.55	3	1	1.33	4

Source: Authors' construct (2022).

number of export spells is greater, indicating a higher likelihood of numerous spells emerging from breaks or failures in agriculture raw material export relationships. In other words, export spells to non-agreement markets almost always fail, necessitating additional costs and effort to rebuild new export relationships. Of the types of EIAs, customs had the most spells on average. The failure of exporters to maintain export flows after a few years of service in the market may be explained by the many barriers to trade in the ECOWAS sub-region.

Fig. 3 depicts the export survival probabilities of agriculture raw materials across trade agreements and non-trade agreement partners. The graph shows how Ghana's agriculture raw material exports to trade agreement partners and non-trade agreement countries have significantly different survival rates. The result demonstrates, once again, that exports to trade agreement partners have a better probability of survival than exports to non-trade agreement countries.

Using the Kaplan-Meier survival functions, Fig. 4 presents the export survival probability of agriculture raw material exports across the types of agreements. Again, the NR-PTA agreement has the highest survival rate for agriculture raw materials, with the PTA type having the lowest survival rate among the three agreements.

4.4. Summary statistics

Tables 5 and 6 summarise the statistical features of the study's variables. It shows the number of observations, mean, standard deviation, and minimum and maximum values. The standard deviation measures the dispersion of the observations from the mean. The highest and minimum values represent the range of the observation.

From Table 5, the average initial export value for manufactured products was only $ 2162.118, which is extremely low [6,5]. paper revealed that the reason for high failure rates among African exporters could be due to shallow initial transaction values of exports. Also, the average observation for distance was 6181.335 km. This result implies that, on average, manufactured product exports travel a distance of 6181.335 km to reach their destination market. But this trend has a detrimental effect on the survival rate of manufactured products. And this is because the longer the distance, the longer the shipment's journey, and the more likely there will be problems or delays, which could lead to the cancellation of orders.

Moreover, the mean observation for a shared common language is 0.282. The mean value implies that, from 1988 to 2018, Ghana shared a common language with only 28.2% of the countries importing manufactured products from Ghana. This observation indicates that most of Ghana's export partners are non-English-speaking countries. This development, however, has negative implications for the survival rate of manufactured products in the export market. Export-survival literature and empirical evidence from Ref. [7] suggest that a shared common official language facilitates the establishment and increases the probability that a trade relationship will succeed.

In Table 6, the mean initial export value for agriculture raw materials was as low as $1774.836. Lower initial export values may represent a lack of ex-ante trust or confidence between exporters and their partners in foreign markets, which may have detrimental impacts on the survival of exports. In addition, the average distance for exports of agriculture raw materials was 6182.101 km. The mean value means that exports of agriculture raw materials travel an average distance of 6182.101 km to reach their final destination. Again, the average observation for a common language is 0.251. This observation means that between 1988 and 2018, Ghana shared a common language with only 25.1% of the countries to which it exported manufactured products. This observation suggests that most of Ghana's export partners do not speak English. On the other hand, this could hurt the survival rate of agriculture raw material exports in the export market.

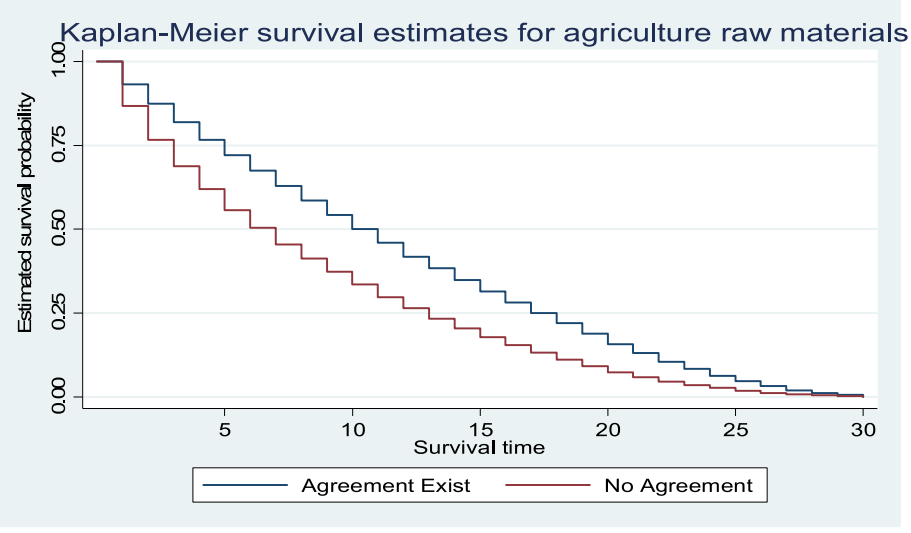

Fig. 3. Export survival estimates for agriculture raw material.
Source: Authors' construct (2022).

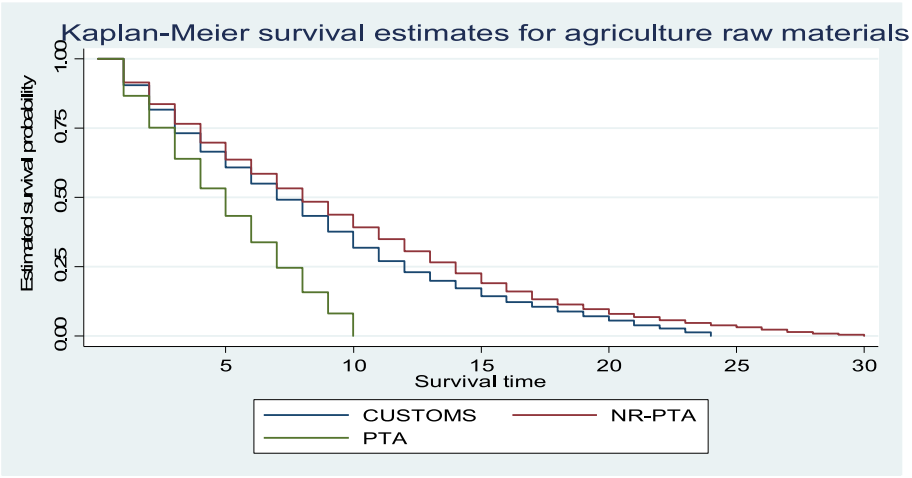

Fig. 4. Export survival estimates for agriculture raw materials, by type of EIA.
Source: Authors' construct (2022).

Table 5
Summary statistics of variables for Manufactured Products, 1988–2018.

Variable	Observation	Mean	Std. Dev.	Min	Max
GDP of the importer	2822	5.51e+11	1.64e+12	1.61e+08	1.79e+13
Initial Export Value	2822	2162.118	8558.962	0.011	58621.970
Population	2822	5.40e+07	1.73e+08	46,999	1.39e+09
Distance	2822	6181.335	3432.113	189.978	18191.380
Common Language	2822	0.282	0.449	0	1
Landlocked	2822	0.167	0.373	0	1
Colonial ties	2822	0.267	0.442	0	1
Common border	2822	0.016	0.128	0	1

Source: Authors' construct (2022).

Table 6
Summary statistics of variables for Agriculture Raw Materials, 1988–2018.

Variable	Observation	Mean	Std. Dev.	Min	Max
GDP of the importer	2114	7.03e+11	1.86e+12	6.21e+08	1.79e+13
Initial Export Value	2114	1774.836	5070.046	0.006	32,860
Population	2114	6.54e+07	1.98e+08	45,624	1.39e+09
Distance	2114	6182.101	3490.524	189.979	17686.87
Common Language	2114	0.251	0.434	0	1
Landlocked	2114	0.156	0.363	0	1
Colonial ties	2114	0.237	0.426	0	1
Common border	2114	0.028	0.164	0	1

Source: Authors' construct (2022).

4.5. Econometric analysis and discussion

This section discusses the estimated effects of EIAs on export survival. EIAs have been shown to increase export survival rates. The paper, just like [4,7,17]; utilizes three EIA-related variables in two models to capture the diverse effects of EIAs on export survival. In this way, the investigation can account for the timing of EIA effects on export relations or spells. The first model assumes an economic integration agreement *(EIA Exists)*. We use the "*EIA Exist"* variable to compare the trade risk between nations with and without agreements. In the second specification, we use "EIA in Effect" and "Spells after Agreement" variables to capture EIAs' differential effects. Due to the homogeneity of the data from the countries in this agreement bloc, the study solely estimates the first model for customs. So, estimating the differential timing of EIA for this agreement is impossible. We provide the results of the discrete-time proportional regression below.

4.5.1. Manufactured exports

Employing a discrete-time proportional hazard model, we estimated the effects of pooled EIAs and separate EIAs on the survival of

manufactured exports. We show the results in Table 7.

From Table 7, the dependent variable is the hazard rate of an export relationship ceasing or failing. As such, a positive coefficient increases the hazard rate, whereas a negative coefficient signifies a decrease in the hazard rate of an export relationship. The estimated coefficient for *"EIA Exist"* negatively and significantly affects the risk of manufactured exports ceasing. This effect also holds in the second specification when the other EIA-related variables are sequentially added. The coefficient is interpreted to mean that the presence of an EIA among trading partners reduces the hazard rate by 94.8%. This finding lends substantial statistical support to the assumption that the existence of an EIA for a pair of countries *(EIA exists)* reduces the likelihood of exports ending or discontinuing. Signing an EIA reduces or eliminates the expenses associated with servicing the export market, restricts competition from non-member nations, and strengthens cooperation with member countries. Hence, country pairs that have had an EIA at some point have a lower hazard rate than those that have never had one. This finding holds for all three EIAs, but the effect is greater for customs agreements. This result is consistent with those of [4,7,17]. However, the results for PTA are contrary to those of [6,5,26]. In particular, Kamuganga [6,5] found that preferential trade agreement enhances rather than reduce hazard rates in Africa.

The dummy *"EIA in Effect"* is significant for pooled EIAs and NR-PTA. This result indicates that EIAs reduce the risk of export failures for export relations initiated before the agreement was signed. This finding is similar to what [4,17] found. They revealed that the onset of an agreement minimizes the risk that exports will stop or fail. For pooled EIAs and PTA, the variable *"Spell Starts After EIA"* had a positive and significant effect on the hazard of export failing. This result implies that EIAs increase the risk of failure for export relations that begin after an agreement is signed. According to Ref. [7]; trade relations or spells initiated following the signing of an EIA may start larger or smaller but grow slower and last shorter than those created before the agreement was signed. This is because EIAs influence a firm's decision to enter or exit an export market by reducing marginal and fixed entry costs. Due to the cost reduction, existing or already active exporting firms will continue to export, increasing the survival rates of old products active in the export market. However, for new exporters or export starters, EIAs are likely to persuade both productive and less productive firms to enter the export market as they may find it more profitable due to the reduction in trade costs.

Conversely, when faced with a demand or market shock, less productive firms are likelier to stop exporting or withdraw from export markets, increasing the likelihood of exiting decisions in export markets. As a result, failure rates are higher in the first few years after an agreement is signed. Hence, while EIAs lessen the risk of existing spells or relationships, they increase the risk of new spells or relationships that start after an agreement is signed.

In both specifications, the hazard of trade failing decreases with the GDP of the importer. We interpret the coefficient for the importer's GDP to mean that a 100% increase in the importer's GDP implies a 39% reduction in hazard rates. The result means that a

Table 7
Effects of EIAs on the survival of manufactured exports.

Dependent Variable: Hazard Rate							
Independent variables	Pooled EIA		NR-PTA		PTA		CUSTOMS
	(1)	(2)	(1)	(2)	(1)	(2)	(1)
EIA Exist	−0.948*** (0.234)	−0.621* (0.371)	−0.850** (0.291)	−0.771** (0 .389)	−0.660** (0 .300)	−0.885** (0 .339)	−0.998** (0 .372)
EIA In Effect		−1.681** (0 .839)		−0.897* (0 .459)		−1.614 (1.114)	
Spell Starts After EIA		1.366 * (0 .819)		0.539 (0.479)		2.909** (1.154)	
Log GDP of Importer	−0.377*** (0 .074)	−0.393*** (0.075)	−0.338*** (0 .081)	−0.320*** (0.082)	−0.405*** (0 .077)	−0.390*** (0 .078)	−0.509*** (0.0705)
Initial Export Value	−2.3e−5 (1.99e−5)	−2.4e−5 (2.01e−5)	−2.29e−5 (2.02e−5)	−2.13e−5 (2e−5)	−2.27e−5 (1.99e−5)	−1.95e−5 (2e−5)	−2.44e−5 (1.94e−5)
Common Language	−0.924*** (0 .261)	−0.953*** (0.267)	−0.913*** (0.265)	−0.871*** (0.265)	−1.00*** (0 .261)	−1.024*** (0.262)	−0.953*** (0 .257)
Distance	7.1e−5** (2.94e−5)	6.9e−5** (2.98e−5)	1.02e−4*** (2.83e−5)	1.03e−4*** (2.78e−5)	9.74e−5*** (9.7e−5)	9.57e−5*** (2.85e−5)	8.85e−5** (2.92e−5)
Colonial ties	0.109 (0.646)	0.116 (0.242)	0.075 (0.243)	0.043 (0.243)	0.166 (0.236)	0.158 (0.237)	0.183 (0.233)
Years of export experience	−0.109*** (0 .025)	−0.103*** (0 .026)	−0.123*** (0 .025)	−0.121*** (0.025)	−0.128*** (0.025)	−0.109*** (0.026)	−0.131*** (0 .025)
Log Population	−0.014 (0.065)	−0.009 (0.066)	−0.053 (0.070)	−0.055 (0.069)	−0.016 (0.069)	−0.028 (0.069)	0.069 (0.065)
Common Border	−1.054 (1.152)	−1.113 (1.163)	−1.722 (1.158)	−1.707 (1.146)	−1.565* (1.163)	−3.033** (1.247)	−0.866 (1.174)
Landlocked	−0.202 (0.233)	−0.223 (0.236)	−0.095 (0.237)	−0.080 (0.234)	−0.189 (0.232)	−0.158 (0.235)	−0.301 (0.231)
Duration Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.935*** (1.629)	10.424*** (1.626)	10.310*** (1.625)	9.666*** (1.651)	11.442*** (1.578)	10.958*** (1.605)	12.720*** (1.582)
Observations	2548	2548	2548	2548	2548	2548	2548
Log Likelihood	−713.769	−711.034	−717.049	−717.049	−715.731	−714.091	−714.091
Wald chi2	248.73	244.22	244.58	244.58	251.21	239.98	239.98

Note: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$ represents significance level at 10%, 5%, and 1%. Robust standard errors are reported in brackets.
Source: Authors' construct (2022).

bigger importer's GDP means a bigger market for Ghana's exports, which makes them more stable. This result is similar to the findings of [26]; which assert that export relations involving economically large importers are more likely to survive. The estimated coefficient for distance was significant and positive, indicating that the hazard of trade failing increases with distance. A longer geographical distance between Accra and an importing country's capital increases the probability of trade failing or stopping. This result is consistent with that of [27]; who found that the duration of exports is longer for products obtained from countries that are geographically closer to Germany. Common official language correlated negatively with the hazard rate. We interpret the coefficient to mean that the presence of a common official language among trading partners reduces the hazard rate by 92.4%. Recalde et al. [17] found similar results for countries in the Latin American region. They found that a common official language facilitates an export relationship and renders it more stable over time.

The estimated coefficient for export experience was negative and significant. The coefficient means that a 100% increase in export experience for pooled EIAs implies a 10.3% reduction in hazard rates. This finding indicates that the hazard rate decreases with the more export experience Ghana has with an export partner. Kamuganga [6,5] found similar results in Africa. He discovered that export experience increases the survival of exports for African exporters across all the regional groups on the continent. These results do not vary across the types of EIAs. But, the effects of common borders were not statistically significant, except for PTA. Surprisingly, the initial export value was insignificant in determining the survival of manufactured product exports. This finding could be attributed to this product's shallow initial export values. Colonial ties also had no statistical or economic effect on the survival of manufactured product exports. It is worth mentioning that [28] found similar results for African exporters. Also, population and landlocked were insignificant in explaining the survival of manufactured product exports.

4.5.2. Agriculture raw materials

The paper estimated the effects of EIAs on the hazard of trade ceasing for agriculture raw materials, and the results are captured in Table 8.

From Table 8, the study estimated the effects of EIAs on the hazard of trade ceasing for agriculture raw materials exports. The estimated coefficient for "*Agreement Exists*" was highly significant and negative in both specifications across the different types of EIAs. When trading partners have an EIA, the coefficient means that the hazard rate of export failing reduces by 110.2%. This indicates that the existence of an EIA decreases the likelihood of failure of an export relationship. This result also means that the risk of exporting agriculture raw materials to countries with which Ghana has an EIA is lower. Consistent with the results of [7]; the effect is greater when the agreement is a customs type. This observation holds for all types of EIAs. However, for PTA [6,5,26], found the opposite of what we did. They found that having a PTA agreement between any two trading partners makes it more likely that an export relation will fail. The estimated coefficient for "*Agreement in Effect*" was insignificant for the EIAs, except for NR-PTA. The result implies that for agriculture raw materials, only NR-PTAs significantly reduce the hazard of trade ceasing for trade spells that were already active. Also, the signs of the coefficients for pooled EIAs and PTA are contrary to the findings of [7]. The estimated coefficient for "*Spell Starts After EIA"* was negative but insignificant. This finding implies that EIAs do not affect already active or spells that started after the agreement was signed for agriculture raw materials. This result does not vary across the types of EIAs.

The estimated coefficient for the GDP of the importing country was significant and negative in both specifications, except for NR-PTA. The coefficient for pooled EIAs can be interpreted as a 100% increase in the importer's GDP resulting in a 16.6% reduction in the hazard rate. It indicates that the risk of failure decreases as the importing country's GDP increases. A greater GDP of an importing country means a larger market and greater potential demand for Ghanaian agriculture raw material exports, hence rendering exports to such markets more stable. Brenton et al. [26] found similar results for countries in developing economies. Initial export value correlated negatively with the hazard rate in both specifications for all the types of EIAs. The results show that the higher the trading partners' initial value, the longer the export duration. This result is consistent with export-survival literature and empirical works from Refs. [15,29]. In particular, Chacha and Edwards [15] discovered that large initial export values significantly enhance the survival of new exporters in Kenya.

The colonial tie was also correlated negatively with the hazard rate. This result holds for all the types of EIAs, except for PTA. It infers that the existence of a colonial tie with an export partner reduces the risk of exiting a market. This finding is consistent with standard trade theory, as a former colony will likely boost trade and make export relations more stable. The result also matches [26] findings. They found that the colonial relationship between the two countries helps exporters in developing countries sustain their export flows. The estimated coefficient for export experience was highly significant and negative across the types of EIAs. It infers that export experience lowers the hazard rate of an export relationship. This finding is identical to that of [12]. He found that the longer a firm continues to export, the better its chances of survival in foreign markets. Unlike manufactured products, common official language and distance have no significant effects on the hazard rate of agriculture raw material exports. Moreover, as in the case of manufactured product exports, variables such as landlocked and population were statistically insignificant in explaining the survival of agriculture raw material exports. It suggests that the effect of these variables on the hazard rate is nil.

4.5.2.1. Robustness test. The study explores the robustness of benchmark results by running a robustness test. Following [4,7,17]; the study ran a logit model using the same sample and variables and found that the logit model produced similar results to that of the original regression. However, only a few minor changes are worth commenting on. The coefficient of the three EIA dummies became statistically insignificant for manufactured products in the second specification for "*Pooled EIAs"* despite generating the same signs. Also, for customs, the coefficient of landlocked became significant for manufactured products. Moreover, the coefficient "*Spell Starts after Agreement"* became significant for agriculture raw materials for "*Pooled EIAs*." Also, for PTA, the "*Agreement in effect"* became

Table 8
Effects of EIAs on the survival of agriculture raw material exports.

Dependent Variable: Hazard Rate							
Independent variables	Pooled EIA		NR-PTA		PTA		CUSTOMS
	(1)	(2)	(1)	(2)	(1)	(2)	(1)
EIA Exist	−1.102*** (0.235)	−1.152** (0.396)	−0.885** (0 .297)	−0.913** (0.390)	−0.635** (0.315)	−1.068** (0.359)	−1.724*** (0.438)
EIA In Effect		*0.516* (0.511)		−0.686* (0.392)		0.021 (0.505)	
Spell Starts After EIA		−0.489 (0.477)		0.634 (0.434)		2.114 (0.630)	
Log GDP of Importer	−0.166* (0.087)	−0.164* (0.087)	−0.127 (0.102)	−0.118 (0.103)	−0.229** (0.0949)	−0.185* (0.098)	−0.401*** (0.091)
Initial Export Value	−4.38e−4** (1.63e−4)	−4.30e−4** (1.62e−4)	−4.36e−4** (1.61e−4)	−4.39e−4** (1.61e−4)	−3.95e−4** (1.57e−4)	−3.95e−4** (1.64e−4)	−3.825e−4** (1.441e−4)
Common Language	0.270 (0.262)	0.219 (0.261)	0.121 (0.280)	0.158 (0.280)	−0.009 (0.284)	0.031 (0.295)	0.201 (0.261)
Distance	2.21e−5 (3.363–5)	0.219 (0.261)	5.59e−6 (3.49e−5)	5.72e−5* (3.46e−5)	5.38e−5 (3.6e−5)	5.49e−5 (3.74e−5)	2.35e−5 (3.39e−5)
Colonial ties	−0.657** (0.270)	−0.659** (0.268)	−0.546* (0.285)	−0.549* (0.285)	−0.382 (0.281)	−0.399 (0.291)	−0.453* (0.260)
Years of export experience	−0.121*** (0.023)	−0.126*** (0.024)	−0.112*** (0 .023)	−0.106*** (0 .023)	−0.113*** (0.023)	−0.399*** (0.291)	−0.118*** (0.023)
Log Population	−0.088 (0.077)	−0.085 (0.076)	−0.114 (0.089)	−0.112 (0.089)	−0.055 (0.086)	−0.399 (0.291)	0.090 (0.075)
Common Border	0.035 (0.592)	0.062 (0.590)	−0.763 (0.672)	−0.720 (0.668)	−0.813 (0.812)	−0.399 (0.291)	0.411 (0.703)
Landlocked	0.174 (0.235)	0.176 (0.232)	0.291 (0.254)	0.298 (0.253)	0.230 (0.255)	0.255 (0.265)	0.016 (0.234)
Duration Dummies	*Yes*	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.334** (2.021)	6.273** (2.006)	5.255** (2.130)	4.768** (2.142)	6.700** (2.111)	5.554* (2.161)	9.033*** (2.126)
Observations	1986	1986	1986	1986	1986	1986	1986
Log Likelihood	−577.232	−576.660	−587.970	−586.087	−590.682	−582.047	−584.537
Wald chi2	202.86	206.20	179.61	182.03	173.88	182.13	200.42

Note: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$ represents significance level at 10%, 5%, and 1%. Robust standard errors are reported in the bracket.
Source: Authors' construct (2022).

significant.

5. Conclusions and policy recommendations

The study set out to determine the survival rate of manufactured products and agriculture raw material exports and to examine the effects of EIAs on the survival of manufactured products and agriculture raw material exports in Ghana. The study's findings revealed that the duration of Ghanaian exports is slightly higher for manufactured products than for agriculture raw material exports. Moreover, the results show that EIAs enhance the survival chances of manufactured products but reduce the survival rate for export relations that started after the agreement was signed. In addition, the results show that EIAs reduce the hazard rate of export failure for agriculture raw material exports and, in particular, enhance the survival of export relations that commenced before the agreement was signed. The paper concludes that Ghana's export duration for manufactured and agriculture products is 9.041 years and 8.817 years. Also, EIAs enhance the survival of Ghana's manufactured products and agriculture raw material exports, with NR-PTA being the most survival-enhancing type of EIA.

The paper provides the following policy recommendations based on its findings. In collaboration with the Ministry of Trade and Industry, the government should implement policy interventions to lower trade costs to deepen EIAs. Specifically, the government should continue negotiating for non-preferential trade agreements. We recommend that the government of Ghana should advocate for a stronger organization and coordination of liberalization policies in the ECOWAS sub-region and the promotion of integration programs to encourage the free movement of exports and reduce the incidence of failure of export relations. In addition, through the Ghana Export Promotion Authority, the government should sensitize exporters about market opportunities with signed trade agreements and provide technical support to exporters to improve their understanding of export market dynamics and enhance their experience. This will enable domestic exporters to gain enough experience with foreign buyers and markets, consequently helping to reduce mismatches and premature failures of export relations.

The Ghana Export Promotion Authority should implement initiatives to help exporters overcome language barriers to facilitate the smooth establishment of trade relations with non-English-speaking countries. This will make it possible for exporters to take advantage of the market opportunities in these countries. We recommend that exporters use ICT to reduce the effect of distance on export flow, reduce trade costs and the incidence of failure, and enhance survival.

The paper has the following limitation: The trade data used in the study informs us when a firm starts, continues, and ceases exporting a particular product to a specific market destination. However, it does not notify us how many firms enter the market at a

specific time or when some firms exit. The lack of detailed firm-level data on exports and imports for Ghana made it impossible to investigate the role of firm-level characteristics and instead relied on the country and product-level trade data. That notwithstanding, the results of this study are still very valid in explaining the survival of manufactured products and agriculture raw material exports in Ghana. As a result, further research should focus on identifying other characteristics or policies that affect export survival more specifically to a firm. Furthermore, further research should focus on how institutional factors affect the survivability of export relations emerging from Ghana.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.heliyon.2022.e12723.

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