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Original Article

Diversion Effect of Economic Integration Agreements

Nguyen Thi Hoang Oanh*, Duong Thi Thuy Linh

Thai Nguyen University of Technology, Tich Luong, Thai Nguyen City, Thai Nguyen, Vietnam

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Abstract: Signing Economic Integration Agreements has proliferated during last three decades. A country signs more and more agreements. Owning the agreements not only generates trade creation but also trade diversion. The diversion effect of Economic Integration Agreements (EIAs) on the probability of products survival and export growth in a market is found in current paper. Using the probit function for 149 countries in SITC 4-digit level from 1962 to 2000, we find the hazard rate of product ceasing increases if a country signs any other EIAs other than its partner (both importer and exporter), and the export growth decreases in the case of an importer owns any other EIA other than its partner.

Keywords: EIAs, hazard rate, importing outsiders, exporting outsiders.

1. Introduction

The duration of a product is the length that the product serves uninterruptedly in a foreign market. In other words, the duration of a product shows for how long a product survives in a market continuously. For instance, if a German car is exported to Vietnam continuously in ten years then this trade relationship is ceased, the duration of this car in the Vietnamese market is 10 years. The length of trade duration of a product is predicted to be not short by the international trade theories, because the trade patterns are predicted to be stable over time. Surprisingly, the mean of the duration of a product is quite short. Over fifty percent of products are ceased in one year, and 80 percent are ended in five years in my sample (see Table 1). Why does the duration of products serve shortly in the foreign markets?

Besedeš and Prusa (2006a) drew a picture of the duration of the U.S. imports from 160 countries during 1972-2001 [1]. The products in their work are recorded by Tariff Schedule and Harmonized System standards in 7 and 10-digit level, respectively. They found that the products that served in the U.S. market were easy to fail, usually ceased in two to four years. The survival of products depends on the length of some first years they served, if they exist after some first years their duration would be longer. Some reasons explaining why products are

* Corresponding author.
E-mail address: nguyenthihoangoanhtn@gmail.com

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more dynamic than we thought are found by Besedeš and Prusa (2006b) [2]. They classified products into three types: homogenous, reference, and differentiated products. Using Kaplan-Meier and Cox hazard estimates, their results showed that the duration rank of three types of products is following: the differentiated products is the longest, followed by the reference priced products, and the shortest duration is the homogenous products. They also proved that the duration of products positively depended on the initial trade values of products. Obashi (2010) also divided the products but into finished products, machinery parts and components (only applied for machinery products) and found the longer and stable relationships for the latter [3]. A buyer who purchases products needs to pay the search costs to find the reliable suppliers as suggested by Rauch and Watson (2003)[1] in the search cost model [4]. If the search costs are high the buyer is prevented from switching the suppliers. That causes the longer product duration. This determinant is found by Besedeš, 2008 [5]. The author used the U.S. import data and divided them (according to the initial sizes) into five groups, the lowest was below $ 10,000 and the highest was above $ 1,000,000. To capture the availability of suppliers and the search costs, the GDP per capita of the exporter is used to proxy for the former, and the country and product characteristic fixed effects are used to proxy for the latter. The results proved that the duration was positively correlated with the initial trade value and the supplier reliability and negatively with the search costs. The product duration also depends on the information uncertainty of importing markets in which providers face with a sunk-cost and a per-period fixed cost. Firms might decide to remain out or ongoing into importing markets after each period time. Applying information uncertainty model for export data of 46 countries during 1975-2003, Besedeš and Prusa (2011) suggested that if developing countries improved their export performance, they should focus on improving the intensive margin which were measured by survival and deepening [6]. Hess and Persson (2011) also found the short duration of products that the EU imported from 140 non-EU members during the period 1962-2006 [7]. Nitsch (2009) and Fugazza and Molina (2011) found determinants which affect the duration as Besedeš (2008) [8, 9]. Nitsch (2009) used 8-digit German imports and found that the duration of products exported to Germany was also affected by the reliability of suppliers, transportation costs, trade values, the elasticity of substitutions, the product types, and the market structures. The length of survival of products exported to German market often lasted from one to three years. Fugazza and Molina (2011) analyzed the duration of trade relationships for 96 countries from 1995 to 2004 and found these determinants affect the duration, especially the duration also changed across regions. Chen (2012) also used the Cox proportional hazard model to analyze the relationship between the innovation and the duration of product of 105 countries exporting to the U.S. during 1972-2006 [10]. He found a positive relationship between the innovation and the duration. Other authors used firm-level data to analyze the survival ability of products such as Bernard and Jensen (2004), Ilmakunnas and Nurmi (2010) or Cadot et al. (2013) [11-13]. Besedeš (2008) argued that the firm-level data would only make the results stronger, but product-level data highlighted the significant dynamics that were not observed from the firm level. Besedeš et al. (2016) examined the duration effects of EIAs by using probit function combining with data from 180 countries during 1962-2005 [14]. They found that EIAs potentially reduced the hazard rate of products that were exchanged before EIAs were signed but increased one that traded after EIAs were formed. They also investigated the positive correlation between the length of EIA relationships and the product duration. Besides

[1] Rauch and Watson (2003) introduced the search cost model where the developed buyer searches for the available suppliers in less developed countries. The search costs drive negatively with the initial transaction value for the new suppliers and positively for the current suppliers and the supplier is available to fulfill the large order.

Besedeš et al. (2016), Kamuganga (2012), Recalde et al. (2016), Türkcan and Saygılı (2018) also found that the formations of EIAs potentially increases the duration of products [15-17]. None of them investigate the diversion effect of EIAs on the duration of products, however. Anderson and Yotov (2016) suggested that ‘‘the proliferation of free trade agreements (FTAs) in the 1990s alarmed many trade policy analysts and popular observers [18]. Trade diverted from non-partners harms their terms of trade. Losses to non-partners could even outweigh the gains to partners, reducing the efficiency of the world trading system’’ (p. 1). Frankel (1997), Adam et al. (2003), Carrère (2006), Dai et al. (2014), Yang and Zarzoso (2016), Esposito (2017), Mattoo et al. (2017) all investigated the diversion effect of EIAs on trade growth instead of the duration of products [19-25]. The current paper focuses on the diversion effect of EIAs on the duration of products.

Obviously, the product's survival ability depends on the competition level in a market. The buyer considers switching to a new supplier, although the current transaction is matched, if the potential supplier is more available. If a product is provided in a market by a preferential member it has advantages (at least with lower import tariffs) comparing with one from non-members. The trade agreements help the trade relationships to exist longer in the market. However, the advantages might be weakened if the buyer has more than one choice with suppliers in other member countries. Similar to that in the exporting side, if producers only find an opportunity (i.e., the exporters have only one EIA) to sell their products at lower prices (because of getting concession of tariffs) they sell their products in that market. However, if they have other opportunities (i.e., owning more than one EIA) to sell their products to then they potentially have chances to choose the optimal market.

The other parts of this paper are organized as: part two is data description and methodology, part three is the empirical models and estimate results, and the last is the conclusion.

2. Data and method

Data used in this chapter stemmed from Feenstra et al. (2005), Baier and Bergstrand where the former is trade data and the latter is EIAs data, and gravity data sources from CEPII [26]. Trade data are bilateral trade flows recorded of 149 countries in SITC 4 digit from 1962 to 2000. EIA data are constructed for 195 bilateral EIA relationships from 1950 to 2012 where Baier and Bergstrand classified EIAs into 6 categories by the level of corporation[2]. While Besedeš et al. (2016) used the 5-digit SITC-revision 1 from 1962 to 2005, we use the 4-digit SITC level from 1962 to 2000 so the total number of observations in their works is doubled than mine. Absolutely, the duration of 4-digit products is longer than one of 5-digit products[3].

To investigate the diversion effect of EIAs on the duration of products, we use the probit function as suggested by Hess and Persson (2012) [27]. A trade relationship (an observation) is conducted from trial aspects: exporter-importer-product. But in an analysis of the product duration, the length of a trade relationship (a spell) that exists continuously in a market at time is used to analyze. A trade relationship can constitute one or more spells (a spell is continuous time that a trade relationship exists in a market). A trade relationship generates only one spell if that survives uninterruptedly during the period or that only enters the market once (some continuous year) and never re-enters. In my sample, the maximum numbers of spells that a trade relationship creates is thirteen. That means a product entered and re-entered 13 times in a market during 1962-2000.

[2] The six levels of EIA agreements from the shallowest to deepest relationship include: one-way Agreements, two-way Preferential Trade Agreements, Free Trade Agreements, Custom Unions, Custom markets, and Economic Unions.

[3] Besedeš and Prusa (2006-a) compare the duration of products imported to the U.S. during 1972-1988 recorded in SITC4 and SITC5, the media (mean) of SITC4 is higher than the media (mean) of SITC5, one and two years (4.2 and 3.9), respectively.

From trade data, there are over 15 million observations in the sample, and we drop out the observations which are recorded from 1962 (the beginning year of the sample) because of the left censor concern (the exact time that those relationships begin[4] is unknown). Then we merge the rest of the trade data with EIAs and gravity variables. Some observations are dropped out because of the missing of EIAs or gravity variables. The gravity variables used in the current work include common language of bilateral members, the colony ties, and the distance as a rough proxy of transportation cost; the market sizes also include and are proxied by the importer and exporter's GDP. Finally, the total number of observations remaining in the sample is 11,665,939.

The main explanatory variables of the current work are the export and import outsiders. The export outsider variable takes the value of one if the exporter signs at least two EIAs in the case it has an EIA with its partner, at least one EIA in the case it does not sign any EIA with its partner, and equals zero otherwise. The same definition is for the import outsider. The average number of EIA relationships per importer and exporter owning in this sample is 50 and 18, respectively. However, there is the deviation in willingness to join EIAs as mentioned above. The deviation is not only in the number of EIA relationships but also in the "quality" of relationships. Some exporters only own the shallowest EIA relationships while the others own the deepest EIA relationships. For instance, in 1973, Afghanistan had 17 EIA relationships and all of them were one way EIAs. While Germany also in 1973 owned 16 EIA relationships. But instead of one way EIAs, its relationships comprised 8 Custom Unions, 6 free trade agreements, and two two-way EIAs. The difference in the quality of relationship potentially creates dissimilar effects on trade duration. However, in the current work we do not investigate the difference in "quality" of outsiders but they are also a potential factor impacting on the duration.

The duration distribution of a product in the sample is provided in Table 1. There are 4,016,638 spells in the sample while the shortest duration of a spell is one year, and the longest duration of one is 39 years. The duration of spells is quite short, 51.3 % survive only one year (while in Besedeš and Nisch, 2013, this fraction is 55.7%), 66.5% survive no more than two years, and 91% serve in foreign market less than ten years [28].

Table 1. Distribution of spell lengths

Spell-length	Number of spells	Fraction of spells
1	2,059,068	51.26
2	611,523	15.22
3	298,122	7.42
4	190,543	4.74
5	126,130	3.14
6	91,964	2.29
7	74,963	1.87
8	61,978	1.54
9	55,587	1.38
10	74,986	1.87
>10	35,157	9.26
Total	4,016,638	100

As in Besedeš et al. (2016) and Recalde et al. (2016), we also set up two EIA dummy variables to distinguish the time that products are traded with the time of EIAs are formed (products are exchanged before or after the EIA formation)[5]. To estimate the diversion effect of signing more EIAs on the duration of products, we use two dummy variables that account for the effects of export and import outsiders on the hazard rate of products ceasing as in Eq. (2).

[4] Hess and Persson (2011) suggest that in the probit function use in hazard analysis the left-censors (the spell begins at the first year in the period) need to drop out in the sample whereas the right-censors they do not create problems in the estimation.

[5] Besedeš et al. (2016) and Recalde et al. (2016) divide the spells into three groups, group A for the spells take place and end before EIAs singed; group B for the spells take place before and end after EIAs signed; group C for the spells take place after EIAs signed.

If a product exits a market after serving in some years it is failed (so called the event happens). To predict the hazard of trade ceasing, as suggested by Hess and Persson (2011), we use the conditional probit function instead of Cox hazard property as Kanaguaga (2012) used. The binary dependent variable takes the value of one in the year they remain out of the market, and equals zero, otherwise (only positive trade values are included) and the right censors also take the value of one. The dependent variable is the probability of products ceasing that does not continue to export from country i to country j at time $t + n$, conditional on it serves in that market (market j) until time t, $P(T_{ijkh} \leq t + n \mid T_{ijkh} \geq t)$, where T_{ijkh} is the length of the spell k of product h country j imports from country i. The conditional probit function used to investigate the diversion effect on the duration of the outsiders is presented in Eq. (1) and Eq. (2).

$$\begin{aligned} p_{ikkht} &= P(T_{ikkh} \leq t+n \mid T_{ikkh} \geq t) \\ &= \Phi(\gamma_1 \ln I_{ijkht} + \gamma_2 \ln dur_{ijkht} + \gamma_3 dis_{ij} + \gamma_4 GDP_{it} + \gamma_5 GDP_{jt} + \gamma_6 lang_{ij} + \gamma_7 col_{ij} \\ &\quad + \gamma_8 cur_{ij} + \gamma_9 EIA_{ijkht} + \gamma_{10} EIA_{aft_{ijkht}} + \gamma_{11} age_{EIA_{ijt}} + \eta_k + \varepsilon_{ijkht} \quad (1) \\ p_{ikkht} &= P(T_{ikkh} \leq t+n \mid T_{ikkh} \geq t) \\ &= \Phi(\gamma_1 \ln i_{ijkht} + \gamma_2 \ln dur_{ijkht} + \gamma_3 dis_{ij} + \gamma_4 GDP_{it} + \gamma_5 GDP_{jt} + \gamma_6 lang_{ij} + \gamma_7 col_{ij} + \gamma_8 cur_{ij} \\ &\quad + \gamma_9 EIA_{ijkht} + \gamma_{10} EIA_{aft_{ijkht}} + \gamma_{11} age_{EIA_{ijt}} + \gamma_{12} exp-out_{i-jt} + \gamma_{13} im-out_{i-jt} + \eta_k + \varepsilon_{ijkht} \quad (2) \end{aligned}$$

where p_{ijkht} is the probability of product h in spell k exported from exporter i to importer j failure at time $t + n$ (the hazard rate of product ceasing) conditional on that spell exists at time t; T_{ijkh} is the surviving duration of product h in spell k exported from i to j. The independent variables in right hand side include: Ini_{ijkht}: the initial values of product h in spell k that is exported from i to j at time t; dur_{ijkht}: the duration of product h in spell k at time t exported from i to j; dis_{ij}: the distance between country i and j which proxies for transportation costs; GDP_{it}: the exporter's market size at time t; GDP_{jt}: the importer's market size at time t; $lang_{ij}$: the common language between country i and j, takes unity if i and j are the same official language, and equals zero, otherwise; col_{ij}: the colony ties between country i and j, takes unity if i and j exist the colony relationship, and equals, zero otherwise; cur_{ijt}: the common currency between country i and j at time t, takes unity if i and j are the common currency, and equals zero, otherwise; EIA_{ijkht}: the EIA effect takes the value of one for the spell k of product h exported from i to j at time t that starts to trade before their EIA is formed and still remains in the market after their EIA is in force, and equals zero otherwise. For instance, Japan and Singapore had traded a product from 2000, and continued to trade it after 2003 at which bilateral trade agreement between Japan and Singapore was signed; $EIA_{aft_{ijkht}}$ takes the value of one if the spell k of product h exported from i to j at time t begins to exchange after their EIA is formed, and equals zero otherwise. This variable also accounts for the effect of EIAs on the duration of product starting after their EIA is formed; $age_{EIA_{ijt}}$: the length of the EIA relationship between country i and j that is the number of years their EIA relationship exists at time t. The maximum length of the EIA relationships in the sample is 39 years; exp - $out_{i\text{-}jt}$: takes the value of one if country i signs any other EIAs other than country j. For instance, in 2004, Vietnam, the exporter, along with other ASEAN countries and China signed an EIA. However, Vietnam has joined ASEAN (from 1995), therefore exporting outsiders in case of Vietnam and China in 2004 are nine ASEAN countries. Vietnam and Japan at the

same time did not sign any EIAs, so exporting outsiders in case of Vietnam and Japan are ASEAN countries and China in 2004. This variable accounts for the diversion effect of EIA outsiders on the product duration; and *imp - out*$_{-ijt}$: takes value of one if country *j* signs any other EIAs other than country *i*. This variable accounts for the purchasing choice of consumers among members or the competitive pressure in importing markets.

To run the Eq. (1) and Eq. (2), we also include the spell fixed effects in the probit function, (η_k). The main interest in the current paper is to evaluate the diversion effects of the outsiders on the duration of products that is measured by the hazard of product ceasing. Before estimating the above profit functions,we summarize the variables in the sample (Table 2).

Table 2. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Event	11,665,939	0.30	0.46	0	1
Initial export value	11,665,939	55.70	13.87	1	8285355
Duration of a product	11,665,939	3.18	2.66	1	38.09184
Distance	11,665,939	4315.63	2.63	60.94	19732.06
Exporter's GDP	11,665,939	$1.21*10^{11}$	7.53	15248627	$1.03*10^{13}$
Importer's GDP	11,665,939	$3.99*10^{10}$	10.48	13936195	$1.03*10^{13}$
Common language	11,665,939	0.12	0.40	0	1
Colony	11,665,939	0.07	0.25	0	1
Common currency	11,665,939	0.01	0.12	0	1
EIA-effect	11,665,939	0.09	0.28	0	1
Spell after EIA formation	11,665,939	0.25	0.43	0	1
Length of EIA	11,665,939	2.13	3.49	1	52.45733
Export outsider	11,665,939	0.89	0.31	0	1
Import outsider	11,665,939	0.75	0.43	0	1

Note: Trade value is measured in thousands of US dollars; GDP is measured in current US$; Distance is measured in km (CEPII); Length of EIA is measured in year.

3. Estimate results

To begin we estimate the Eq. (1) firstly, where excludes two last variables (outsiders) to estimate the effects of EIAs on the duration as Besedeš et al. (2016). However in our sample the products are recorded in 4-digit level (while in their works, products are recorded in 5-digit level, and their data is longer than ours 5 years) that reduce the hazard of products ceasing. In addition, they used the bilateral import flows while we use the bilateral export flows as Dai et al. (2014). The estimate results are presented in Table 3[6], column 1.

The estimate results of the factors affecting the hazard rate of products ceasing are similar to Besedeš et al. (2016). These factors include the initial value of export, the duration of a spell, the distance between a pair, the importer and exporter's GDP, the common language, the colony ties, and the length of the EIA relationships. The hazard of product ceasing is negatively correlated with the initial export value, the length of the spell duration, the exporter's GDP, the importer's GDP, the common language, and the colony ties. And the hazard of product ceasing is positively correlated with the distance of a pair and the length of their EIA relationships. The EIAs which are formed after products are exchanged increase the probability of product survival. The

[6] The marginal effects of probit function are provided in Tables 7-9.

longer EIA relationships are, the higher hazard of products ceasing is. Those factors impacting on duration of products are similar to the outcomes of Besedeš et al. (2016). Our estimate result is different from Besedeš et al. (2016) in the effect of EIAs on the hazard of products ceasing that are traded after the EIA formed. As we mentioned above the difference in disaggregate products might cause this outcome, as Besedeš and Prusa (2006-a) found the more disaggregate the shorter duration of products. The probability of products survival increases if pairs of countries' products are traded after their EIA formations.

Table 3. The effect of EIAs on the hazard of the product ceasing

Variables	(1) event	(2) event
Initial export value (ln)	-0.0459***	-0.0511***
	(0.000196)	(0.000198)
Duration of a product (ln)	-0.434***	-0.437***
	(0.000479)	(0.000480)
Distance (ln)	0.0459***	0.0482***
	(0.000472)	(0.000475)
Exporter's gdp (ln)	-0.0132***	-0.0119***
	(0.000233)	(0.000240)
Importer's gdp (ln)	-0.00411***	-0.0120***
	(0.000213)	(0.000218)
Common language	-0.0317***	-0.0288***
	(0.00109)	(0.00110)
Colony	-0.0920***	-0.0961***
	(0.00176)	(0.00177)
Common currency	0.392***	0.416***
	(0.00323)	(0.00323)
EIA-effect	-0.207***	-0.277***
	(0.00286)	(0.00289)
Spell after EIA formation	-0.0822***	-0.0887***
	(0.00250)	(0.00250)
Length of EIA (ln)	0.109***	0.120***
	(0.00111)	(0.00112)
Export-outsider		0.178***
		(0.00139)
Import-outsider		0.134***
		(0.00107)
Constant	0.0525***	0.140***
	(0.00826)	(0.00782)
Observations	11,665,939	11,665,939
Spell number FE	YES	YES

Note: Standard errors are in parentheses;
*** Significant at 1%; ln is natural logarithm.

Now we add two variables that account for the diversion effect of EIAs on the hazard of products ceasing and run the regression in Eq. (2). The estimate results are provided in column 2 of Table 3. The signs of all variables' coefficients in column 2 are the same as the signs of variables' coefficients in column 1. The main interesting results are as conjecture, both the export and import outsiders potentially lead to the higher hazard of products ceasing. If exporter *i* signs any other EIA (except country *j*) the hazard of products ceasing exported from *i* to *j* increases and if the importer signs any other EIA (except country *i*) the hazard of products ceasing exported from *i* to *j* increases, also.

The estimate results of the length of EIAs impacting on hazard of products ceasing provide an evidence for the "timing" effect of EIA relationships on extensive and intensive margins[7]. We add the lagged 1, 2, 3, 5, and 9 periods to evaluate the "timing" effect of EIA relationships and estimate the Eq. (2) again. The outcomes are provided on Table 4 (lag 1, 2, 3, 5 and 9 correspond with column 2, 3, 4, 5, and 6). Timing effect of EIA on trade is found in the trade growth and trade margins but is not proved in the duration of products in the literature. To the best of our knowledge, this is the first paper analyzes this matter.

The estimate results are consistent with the Baier et al. (2014), that the intensive margin will be affected sooner than the extensive margin by the EIA formations [29]. For the spells that start before EIA formations, the duration of products ceasing increases after only one year EIAs are in force. That means starting from the second year the old spells are substituted by the new spells. The level of substitution from second year occurs strongly, continues to increase in the third year, and reduces a little bit in fourth and fifth year. That

[7] Besedeš and Prusa (2011) measure the extensive margin by changes in the products and destinations exported: the new products are exported to old destinations, the old products are exported to new destinations, and the new products to new destinations.

is consistent with the mean of duration of products as we find in Table 1 and other authors as mentioned in part 1, most of them have duration only from one to four years. For the spells that exist until ten years, the capacity of products substituted is extremely small comparing with those only existing from one to four years. For the spells that are traded after EIA formations, in first three years, the effect of EIAs on the hazard rate of products ceasing increases at the current year but decreases at the lag of year one and two. After 3 years, both types of spells are substituted by the new spells, the hazard of products ceasing increases in all lag 3, lag 5 and lag 9. The importance is that the diversion effect of both export and import outsiders are still significantly positive through five specifications.

Table 4. The "phase-time" effect of EIA relationships on duration

	(1)	(2)	(3)	(4)	(5)
Variables	event	event	event	event	event
Initial export value (ln)	-0.0176***	-0.0131***	-0.0123***	-0.00803***	-0.00475***
	(0.000247)	(0.000265)	(0.000279)	(0.000305)	(0.000366)
Duration of a product (ln)	-0.221***	-0.223***	-0.236***	-0.249***	-0.254***
	(0.000783)	(0.000737)	(0.000753)	(0.000811)	(0.000972)
Distance (ln)	0.0339***	0.0261***	0.0225***	0.0156***	0.0210***
	(0.000594)	(0.000640)	(0.000678)	(0.000754)	(0.000938)
Exporter's gdp (ln)	-0.00890***	0.000757**	0.00718***	0.0126***	0.0215***
	(0.000312)	(0.000338)	(0.000363)	(0.000411)	(0.000535)
Importer's gdp (ln)	-0.0173***	-0.0162***	-0.0142***	-0.0153***	-0.0127***
	(0.000276)	(0.000297)	(0.000315)	(0.000350)	(0.000434)
Common language	-0.0326***	-0.0273***	-0.0253***	-0.0410***	-0.0238***
	(0.00138)	(0.00148)	(0.00156)	(0.00173)	(0.00209)
Colony	-0.0960***	-0.0930***	-0.0847***	-0.0606***	-0.0856***
	(0.00216)	(0.00230)	(0.00241)	(0.00262)	(0.00313)
Common currency	0.525***	0.577***	0.609***	0.643***	0.804***
	(0.00381)	(0.00404)	(0.00422)	(0.00453)	(0.00534)
Export-outsider	0.186***	0.175***	0.186***	0.188***	0.193***
	(0.00182)	(0.00198)	(0.00213)	(0.00240)	(0.00309)
Import-outsider	0.108***	0.109***	0.113***	0.0995***	0.0582***
	(0.00140)	(0.00153)	(0.00164)	(0.00184)	(0.00235)
EIA-effect	-0.225***	-0.214***	-0.157***	-0.136***	-0.138***
	(0.00511)	(0.00407)	(0.00360)	(0.00334)	(0.00350)
Spell after EIA formation	0.392***	0.161***	-0.0178***	-0.0115**	0.00709
	(0.0150)	(0.00660)	(0.00525)	(0.00446)	(0.00432)
lag1EIA-effect	0.138***				
	(0.00547)				
lag1spel-after-EIA	-0.335***				
	(0.0151)				
lag2EIA-effect		0.173***			
		(0.00443)			
lag2spel-after-EIA		-0.148***			
		(0.00663)			
lag3EIA-effect			0.128***		
			(0.00403)		
lag3spel-after-EIA			0.0303***		

			(0.00532)		
lag5EIA-effect				0.129***	
				(0.00382)	
lag5spel-after-EIA				0.00648	
				(0.00455)	
lag9EIA-effect					0.0243***
					(0.00420)
lag9spel-after-EIA					0.134***
					(0.00467)
Constant	-0.438***	-0.706***	-0.880***	-0.845***	-0.969***
	(0.0105)	(0.0115)	(0.0124)	(0.0141)	(0.0186)
Observations	8,103,100	7,172,533	6,435,664	5,230,215	3,368,345
Spell number FE	YES	YES	YES	YES	YES

Note: Standard errors are in parentheses; ** Significant at 5%;
*** Significant at 1%; ln is natural logarithm.

Finally, we divide the sample into two sectors, agricultural and manufacturing sectors, and investigate the probability of product failures affected by diversion effect of other EIA relationships for each sector. The estimate results are presented in Table 5, column 1 for manufacturing sector and column 2 for agricultural sector.

Table 5. The Hazard of Agricultural and Manufacturing Products Ceasing

Variables	(1) event	(2) event
Initial export value (ln)	-0.0487***	-0.0625***
	(0.000237)	(0.000459)
Duration of a product (ln)	-0.423***	-0.469***
	(0.000544)	(0.00120)
Distance (ln)	0.0517***	0.0368***
	(0.000554)	(0.00108)
Exporter's gdp (ln)	-0.0129***	-0.000480
	(0.000294)	(0.000501)
Importer's gdp (ln)	-0.0142***	-0.00498***
	(0.000250)	(0.000525)
Common language	-0.0285***	-0.0331***
	(0.00126)	(0.00260)
Colony	-0.104***	-0.0817***
	(0.00204)	(0.00419)
Common currency	0.477***	0.252***
	(0.00380)	(0.00719)
EIA-effect	-0.279***	-0.288***
	(0.00335)	(0.00669)
Spell after EIA formation	-0.110***	-0.0138**
	(0.00288)	(0.00574)
Length of EIA (ln)	0.126***	0.100***
	(0.00130)	(0.00257)
Export-outsider	0.187***	0.169***
	(0.00159)	(0.00339)
Import-outsider	0.145***	0.104***
	(0.00122)	(0.00260)
Constant	0.0160	-0.0310*
	(0.00978)	(0.0185)
Observations	9,152,772	1,874,353
Spell number FE	YES	YES

Note: Standard errors are in parentheses;
*** Significant at 1%; ln is natural logarithm.

The effects of all variables on the hazard rate are similar across two sectors and the pooled products, only differences in the magnitudes of coefficients. The diversion effect of EIA formations is greater in the manufacturing sector than one in the agricultural sector (the coefficient magnitudes of both export and import outsiders is greater in case of the manufacturing sector than one of the agricultural sector). The differences in the magnitudes are consistent with the higher manufacturing products' elasticity of substitution than agricultural products' one as the assumption in the model that Segura-Cayuela and Vilarrubia (2008) introduced, the uncertain costs that exporters need to pay if they enter foreign markets (Table 5) [30].

The export and import outsiders might impact on the export growth. Applying the

method as suggested by Besedeš et al. (2016) where they use only the positive import growth to investigate the effects of EIAs, we estimate the export growth effect of the export and import outsiders. The OLS approach is used to estimate in which the dependent variable is the export growth (the change of logarithm of trade value between two years is positive) and the independent variables are the bunch of variables that we use in the probit function. So the model is Eq. (3):

$$G_{ikkht} = \gamma_0 + \gamma_1 \ln i_{ijkht} + \gamma_2 \ln dur_{ijkht} + \gamma_4 GDP_{it} + \gamma_5 GDP_{jt} + \gamma_6 cur_{ij} + \gamma_7 EIA_{ijkht} + \gamma_8 EIA_{aft_{ijkht}} + \gamma_9 age_{EIA_{ijt}} + \gamma_{10} exp-out_{i-jt} + \gamma_{11} im-out_{i-jt} + \eta_k + \delta_t + \theta_{ij} + \beta_H + \varepsilon_{ijkht} \quad (3)$$

Where G_{ijkht}: the positive trade growth of product h in spell k from country i to country j at time t (taking the natural logarithm), δ_t is year fixed effect, θ_{ij} are country-pair fixed effects account for the time-invariant variables between two countries; β_H are the 2digit-SITC sector fixed effects; and ε_{ijkht} is error term. Other dependent variables are the same as dependent variables in the Eq. (2).

The estimate results are provided in Table 6. As finding in Besedeš et al. (2016) and Besedeš and Nisch (2013), the greater the initial value and the higher the duration of products are the lower the trade growth is. If the initial values or the duration of products increases 1%, the export growth decreases 0.14%, or 0.4%, respectively. The importer market size increases 1% the export growth increases 0.01%. Baier et al. (2014) suggested that the full implementation that an EIA impacts on bilateral trade of a pair is around 10 or 15 years, where our estimate results show that the export growth of the spells that begin before and after the EIA formation are positive signs. However the signal which confirms this conclusion is the negative correlation between the length of EIA relationships and the trade growth. If the EIA relationships last more one year the export growth decreases 0.1%. The outsiders that the other factor impacts on the export growth which are found in the current work are consistent with Dai et al. (2014).

They added three dummy variables that account for the trade creation and trade diversion. The other way they use to estimate the trade diversion is that they divided the export and import outsiders into three groups, the first was a pair of countries that did not have any outsiders or they did not sign any EIA with any countries at time t, the second was the bilateral that owned from 1 to 8 EIA outsiders, and the third owned above 8 outsiders (both exporters and importers divided as the same procedure). They found that the importing outsiders was significantly negative impact on export growth, but did not find the evidence for the exporting outsiders. Our estimate results also show the same conclusion. While the exporting outsiders are insignificant effects, the importing outsiders are negatively significant effects on the export growth. If importers sign any other EIAs, the export growth of a pair decreases 0.06% (Table 6).

Table 6. The diversion effects of outsiders on the export growth

Variables	Export growth
Initial export value (ln)	-0.146***
	(0.000418)
Duration of a product (ln)	-0.414***
	(0.00120)
Exporter's gdp (ln)	-0.0738***
	(0.00294)

Importer's gdp (ln)	0.0153***
	(0.00251)
Common currency	-0.0214**
	(0.00898)
EIA_effect	0.0170***
	(0.00171)
Spel_after_EIA (ln)	0.159***
	(0.00402)
Length of EIA	-0.102***
	(0.00232)
Export outsiders	0.00626
	(0.00430)
Import outsiders	-0.0650***
	(0.00312)
Constant	2.563***
	(0.0959)
Observations	4,377,592
R-squared	0.199

Note: Standard errors are in parentheses; *** Significant at 1%.; ln is natural logarithm. Coefficient estimates for country-pair, sector, spell and-time effects are not reported for brevity.

Table 7. Marginal effects of EIAs on the hazard rate of products ceasing

	(1)	(2)
Variables	Marginal effect	Marginal effect
Initial export value (ln)	-0.0145***	-0.0161***
	(6.15e-05)	(6.21e-05)
Duration of a product (ln)	-0.137***	-0.138***
	(0.000137)	(0.000137)
Distance (ln)	0.0145***	0.0152***
	(0.000149)	(0.000150)
Exporter's gdp (ln)	-0.00419***	-0.00375***
	(7.37e-05)	(7.57e-05)
Importer's gdp (ln)	-0.00130***	-0.00377***
	(6.73e-05)	(6.88e-05)
Common language	-0.0100***	-0.00910***
	(0.000346)	(0.000346)
Colony	-0.0291***	-0.0303***
	(0.000557)	(0.000557)
Common currency	0.124***	0.131***
	(0.00102)	(0.00102)
EIA_effect	-0.0643***	-0.0853***
	(0.000868)	(0.000861)
Spell after EIA formation	-0.0258***	-0.0277***
	(0.000775)	(0.000772)
Length of EIA (ln)	0.0346***	0.0379***
	(0.000352)	(0.000352)
Export_outsider		0.0544***
		(0.000408)
Import_outsider		0.0415***
		(0.000325)
Observations	11,665,939	11,665,939

Note: Standard errors are in parentheses; *** Significant at 1%; ln is natural logarithm

Table 8. The marginal effects of the "phase-time" effect of EIA relationships on duration

Variables	(1) ME	(2) ME	(3) ME	(4) ME	(5) ME
Initial export value (ln)	-0.00484***	-0.00351***	-0.00329***	-0.00217***	-0.00135***
	(6.81e-05)	(7.10e-05)	(7.45e-05)	(8.23e-05)	(0.000104)
Duration of a product (ln)	-0.0608***	-0.0600***	-0.0630***	-0.0674***	-0.0723***
	(0.000214)	(0.000196)	(0.000198)	(0.000215)	(0.000270)
Distance (ln)	0.00934***	0.00701***	0.00602***	0.00421***	0.00596***
	(0.000164)	(0.000172)	(0.000181)	(0.000204)	(0.000267)
Exporter's gdp (ln)	-0.00245***	0.000203**	0.00192***	0.00340***	0.00612***
	(8.59e-05)	(9.08e-05)	(9.69e-05)	(0.000111)	(0.000152)
Importer's gdp (ln)	-0.00476***	-0.00435***	-0.00379***	-0.00414***	-0.00360***
	(7.59e-05)	(7.96e-05)	(8.41e-05)	(9.47e-05)	(0.000123)
Common language	-0.00900***	-0.00734***	-0.00675***	-0.0111***	-0.00676***
	(0.000380)	(0.000397)	(0.000418)	(0.000466)	(0.000594)
Colony	-0.0265***	-0.0250***	-0.0226***	-0.0164***	-0.0243***
	(0.000596)	(0.000618)	(0.000644)	(0.000709)	(0.000890)
Common currency	0.145***	0.155***	0.163***	0.174***	0.229***
	(0.00105)	(0.00108)	(0.00112)	(0.00122)	(0.00151)
Export-outsider	0.0483***	0.0445***	0.0467***	0.0477***	0.0519***
	(0.000442)	(0.000471)	(0.000500)	(0.000573)	(0.000777)
Import-outsider	0.0291***	0.0285***	0.0294***	0.0262***	0.0163***
	(0.000367)	(0.000389)	(0.000413)	(0.000472)	(0.000649)
EIA-effect	-0.0601***	-0.0558***	-0.0410***	-0.0362***	-0.0386***
	(0.00131)	(0.00103)	(0.000922)	(0.000872)	(0.000967)
Spell after EIA formation	0.115***	0.0446***	-0.00474***	-0.00309***	0.00202
	(0.00461)	(0.00188)	(0.00139)	(0.00120)	(0.00123)
lag1EIA-effect	0.0388***				
	(0.00156)				
lag1spel-after-EIA	-0.0861***				
	(0.00358)				
lag2EIA-effect		0.0476***			
		(0.00124)			
lag2spel-after-EIA		-0.0386***			
		(0.00167)			
lag3EIA-effect			0.0349***		
			(0.00111)		
lag3spel-after-EIA			0.00815***		
			(0.00144)		
lag5EIA-effect				0.0355***	
				(0.00107)	
lag5spel-after-EIA				0.00175	
				(0.00123)	
lag9EIA-effect					0.00694***
					(0.00120)
lag9spel-after-EIA					0.0391***
					(0.00139)
Observations	8,103,100	7,172,533	6,435,664	5,230,215	3,368,345

Note: Standard errors are in parentheses; *** Significant at 1%;
ln is natural logarithm; ME is the marginal effect.

Table 9. The marginal effects of the hazard of manufacturing and agricultural products ceasing

Variables	(1) Marginal effect	(2) Marginal effect
Initial export value (ln)	-0.0152***	-0.0204***
	(7.32e-05)	(0.000148)
Duration of a product (ln)	-0.131***	-0.153***
	(0.000155)	(0.000346)

Distance (ln)	0.0161***	0.0120***
	(0.000172)	(0.000353)
Exporter's gdp (ln)	-0.00400***	-0.000157
	(9.14e-05)	(0.000164)
Importer's gdp (ln)	-0.00440***	-0.00163***
	(7.78e-05)	(0.000172)
Common language	-0.00886***	-0.0108***
	(0.000391)	(0.000849)
Colony	-0.0323***	-0.0267***
	(0.000634)	(0.00137)
Common currency	0.148***	0.0823***
	(0.00118)	(0.00235)
EIA-effect	-0.0844***	-0.0925***
	(0.000976)	(0.00209)
Spell after EIA formation	-0.0338***	-0.00452**
	(0.000873)	(0.00188)
Length of EIA (ln)	0.0393***	0.0328***
	(0.000403)	(0.000838)
Export-outsider	0.0561***	0.0537***
	(0.000456)	(0.00105)
Import-outsider	0.0440***	0.0336***
	(0.000362)	(0.000830)
Observations	9,152,772	1,874,353

Note: Standard errors are in parentheses; ***Significant at 1%; ln is natural logarithm.

4. Conclusions

Joining the EIA relationships has been attracting many countries nearly past three decades. An exporter or an importer owns more EIA relationships as a main aspect which helps them jump into other EIA relationships as finding in Baier et al. (2014). However, owning more EIA relationships also creates the diversion effect on the export growth as supported by Dai et al. (2014) and the current work.

If the exporter and importer sign many EIA relationships that potentially impact negatively on the probability of their products serving in an importing market. These effects keep for both pooled products and manufacturing and agricultural sectors. The duration of products is shorter if either exporters or importers sign any other EIAs other than their EIA. The outsiders also impact on the export growth, especially importing outsiders. If the importing market owns more EIA relationships the consumers are more flexible to capture the changes getting from the EIA formations.

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