

## The Lasting Effects of Economic Integration Agreements on Trade

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This paper investigates the lasting effect of economic integration agreements (EIA) on trade flows after the agreement is terminated or member countries withdraw from it. Using bilateral trade data among 149 countries over the period 1962-2000, we find that the positive effect of EIAs on trade persists even after the agreement is terminated. This effect occurs mainly along the intensive margin. The lasting effect is stronger in the first few years after the EIA is terminated, and it gets weaker and becomes insignificant in the long run. Our findings are robust to various empirical model specifications and measurements of variables.

**Keywords:** economic integration agreements, extensive margin, intensive margin, panel data

**JEL classification:** F1, F10, F15

### 1 Introduction

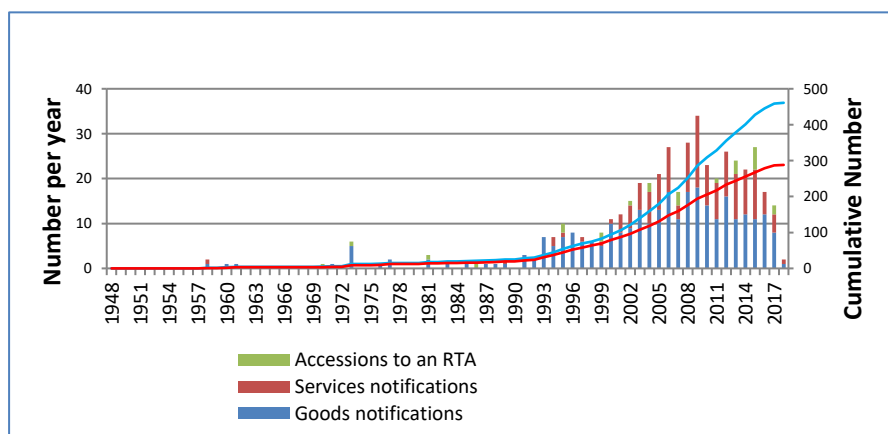
While multilateral negotiations led by the World Trade Organization (WTO) had made little progress since the Doha development round, economic integration agreements (EIAs),<sup>1</sup> including regional trade agreements (RTAs) and preferential trade agreements (PTAs), have played a more important role in the global system over the past decades. In the year of 1990, there were 48 regional trade agreements (RTAs) in force. This number had increased from 181 in the year 2000, to 331 in the year 2010, and to 459 in the year 2017 (see Fig.1). In 2010, the average number of EIAs that each member of the WTO joined was 13 (Limão, 2016). Although the number of active EIA increases steadily, there is also a certain number of EIAs

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<sup>1</sup> Economic integration agreements in this paper include preferential trade agreements (PTAs) and the regional trade agreements (RTAs). In the WTO, PTA refers to agreements of unilateral and non-reciprocal liberalization, and RTA refers to reciprocal agreements including free trade agreements, customs unions, common markets, and economic unions.

being terminated and become inactive.<sup>2</sup> Additionally, several remarkable international events in recent years seemed to indicate that there is an emerging opinions disagreeing with the trend of globalization. In 2016, the U.K. held a referendum to decide whether to stay or leave the E.U., and finally the leaving side won by 51.9% to 48.1%. In 2017, President Donald Trump of the U.S. signed a presidential memorandum to withdraw the U.S. from the Trans-Pacific Partnership (TPP), a free trade agreement of twelve countries. Before the completion of renegotiating North American Free Trade Agreement (which is later replaced by the United States-Mexico-Canada agreement) and the United States-Korea Free Trade Agreement (KORUS FTA), President Trump once also considered terminating these trade agreements and claimed that the “NAFTA is the worst trade deal ever”.<sup>3</sup>



Source: WTO, 2018

Note: Notifications of RTAs: goods, services & accessions to an RTA are counted separately. Physical RTAs: goods, services & accessions to an RTA are counted together. The cumulative lines show the number of notifications/physical RTAs currently in force.

**Figure 1. RTAs Currently in Force (by year of entry into force), 1948-2018**

While the trade creation and diversion effects of forming an EIA have been widely studied in the trade literature, the effect of leaving an EIA, either due to a member country withdrawing from it or a termination of the agreement, remains unclear. For instance, Limão (2016) mentioned that past trade agreements can be a determinant of the trade creation, diversion, and price effects, and future works are required to verify the causal relationship. Most existing empirical literature using the gravity model to examine the impact of EIA includes a dummy variable to account for the status of trade agreements: that is, whether or not the two trading countries

<sup>2</sup> For example, Costa Rica, Guatemala, Honduras, Nicaragua, and El Salvador signed an EIA in 1951 and then broke it in 1970. Egypt and India cancelled their EIA that lasted from 1968-1982. Mozambique withdrew from Southern African Development Community in 1997.

<sup>3</sup> In 2018, NAFTA (North American Free Trade Agreement) was renegotiated and replaced by USMCA (United States-Mexico-Canada agreement), and the renegotiation of KORUS also reached an agreement in the same year.

have trade agreements in effect. This type of setting, nevertheless, cannot distinguish the case that the trading partners are never in an agreement from the case that they were once in a trade agreement which is broken out later. In the estimations, both cases have the EIA dummy variable equals zero (which means no active EIA between the two countries), but the trade effect can be quite different. Since the gravity model finds that former colonial ties have significant influence on trade volumes, past trade agreement may also have similar impacts. We analyze the lasting effect of EIAs on the extensive and intensive margins separately for two reasons. First, according to Hummels and Klenow (2005), trade expansions along the two margins have different welfare implications. If trade expands along the extensive margin, it increases the varieties of products, which improves the welfare by offering consumers more choices and lowering production risks. If trade expands along the intensive margin, the higher quantity may worsen the terms of trade, which can lead to a decrease in the welfare. Second, Baier and Bergstrand (2007) and Baier *et al.* (2014) show evidence of the heterogeneous timing effect of forming EIAs: when a trade agreement is signed, the intensive margin usually responds more quickly than the extensive margin does. This heterogeneity can also occur in the lasting effect of EIAs. Understanding the changes in trade margins after a trade agreement is terminated can help the policy makers to predict the consequences and to make correct decisions.

The objective of this paper is to fill this gap by estimating the lasting effects of EIAs after the relationships are terminated or broken.<sup>4</sup> It contributes to the theoretical and empirical literature that studies the effect of EIA on trade flows, terms of trade, and social welfare, as summarized by Adam *et al.* (2003), Dee and Gali (2005), and Limão (2016). The theoretical work of the effect of trade agreements is introduced by Viner (1950), which establishes the concepts of trade creation and diversion effects of signing EIAs. Empirical works evaluating the impact of EIAs on trade flows use two approaches: the *ex-ante* and *ex post* analyses. The *ex-ante* analysis uses computable general equilibrium (CGE) models of trade to evaluate the welfare change induced by joining EIAs. The model considers both the trade creation and trade diversion effects between member and non-member countries, and the welfare effect is measured in terms of GDP shares prior to the formation of the EIA. Scollay and Gilbert (2000) evaluate the economic benefits and the key policy issues of the Asia-Pacific Economic Cooperation (APEC) after its

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<sup>4</sup> Countries terminate or withdraw from trade agreements due to economic, political, or social reasons. In some cases, developed countries signed one-way PTA with developing countries to give these countries preferential treatments in terms of lower trade barriers and regulations. These agreements are sometimes terminated when the developing countries advance in economic growth and thus no longer need special treatments. In the case of Brexit referendum, supporters of leaving EU believe that withdrawing from the economic union can maintain the sovereignty of UK and mitigate problems caused by illegal immigrants. U.S. president Donald Trump once considered terminating NAFTA because he thought that the trade deal led to unemployment in the manufacturing sector and held back the wage growth of the U.S.

declaration of liberalization in trade and investments. Robinson and Thierfelder (2002) conclude that the trade creation effect is greater than the trade diversion effect, and the net gain is larger if the model is analyzed with respect to the new trade theory. Anderson and Yotov (2016) use an endowments general equilibrium model to investigate the effect of FTA on terms of trade. They find that global efficiency increases by 0.9%, with individual countries gain over 5% of the real output and others lose less than 0.3% of it. The ex post studies of EIAs use econometrics estimations to find the causality between EIA formation and actual trade flows, controlling for other important determinants of trade in the literature. Most of these studies use the gravity model of international trade. The pioneering work by Tinbergen (1962) includes a FTA dummy variable in the estimations which equals one if the exporting country belongs to the British Commonwealth system and receives a preferential treatment from the importing country. The estimated results show that the FTA does have a significant impact on trade flows but insignificant if country pairs are members in Benelux FTA. Aitken (1973) sets two dummy variables which equal one if both trading partners are members of EEC or EFTA, respectively. Using cross-sectional data, the study shows that both EEC and EFTA have improved trade growth among member countries. The foundation of EFTA also imposes negative impacts on the exports of the five EEC countries.

While these earlier studies focus on the effects of one or a few specific EIAs, more recent works investigate the issue using datasets with a greater number of countries and products, and analyze the heterogeneous trade effect across different types of EIAs. For instance, Foster et.al (2011) examine the trade creating effects of preferential trade agreements (PTAs) for a large sample of countries in the period 1962-2000. By taking a PTA dummy variable which equals one if the bilateral country-pair has a PTA, they find that forming a PTA raises trade values between member countries, and much of this increase occurs along the extensive margin. Baier et.al (2014) examine how trade cost varies with the formation of EIA by using data of a large number of country pairs, product categories, and EIAs from 1962 to 2000. They provide the first evidence of the trade effect of different types of EIAs using the gravity equation with both the extensive and intensive margins (at the product level). They find that agreements with deeper levels of integration have greater impacts on aggregate trade flows, which is mainly driven by the intensive margin. They also provide the first evidence of the heterogeneous “timing” effect of EIA between the intensive and extensive margins, and find that the intensive margin responds sooner than the extensive margin does. Kohl *et al.* (2013) classify trade agreements by 17 trade-related policy domains and legally enforceable commitments to examine the possible heterogeneous trade effects across them. Dür *et al.* (2014) establish a new data set of trade agreements that shows difference across these

agreements in terms of their contents and designs. They find that the positive overall effects of PTAs on trade flows are driven by agreements with deep integration. Baier *et al.* (2019) use a two-stage estimation strategy to investigate the heterogeneity trade effect within FTAs. They find an asymmetric trade effect on different country pairs within the same FTA.

In addition to the trade creation effect, the literature also analyzes the trade diversion and terms of trade effect of EIAs. Dai *et al.* (2014) evaluate both the trade creation and trade diversion effects of FTA established during 1990-2002. They find that FTAs divert trade away from non-member countries and even more so from internal trade (domestic sales) in member countries. To estimate the trade diversion effect, they include two binary variables in the models. The dummy variable equals one if the exporter (importer) signs any FTA with countries other than the importer (exporter) of the trade relationship. Mattoo *et al.* (2017) show that agreements of deep integration lead to greater trade creation and weaker trade diversion than those of shallow integration.

The current paper extends the literature by accounting for past relationships of trade agreements that are no longer active. This work is motivated by the search model of international trade in Besedeš (2008).<sup>5</sup> In the international markets, a match between a supplier and a buyer must be made before a transaction can take place. Buyers must pay a search cost whenever a search is undertaken. They then pay for initial investments, learn the supplier's ability, and make positive profit if the supplier is successful. If at any point the supplier is rejected, the buyer will search again. A successful relationship gives the buyer access to a network of potential suppliers in the sourcing country, which can introduce the buyer to a new supplier with lower costs. According to this framework, former EIA relationships can help buyers in the member countries to retain trade with each other, even after the trade agreements become obsolete. To the best of our knowledge, this is the first study that explicitly estimates the causal effect of how past trade agreements that are no longer active affect the extensive and intensive margins of trade with a large number of country pairs, EIAs, products, and years. We employ a panel data covering 149 countries in the period of 1962-2000 to study this issue.

The rest of this paper is structured as following: section 2 describes data sources and how to construct EIA variables and the extensive and intensive margins of trade; section 3 shows the empirical model specifications; sections 4 and 5 present the estimated results; and section 6 concludes.

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<sup>5</sup> The original model is presented in Rauch and Watson (2003).

## 2 Data and Variables

Estimations of this paper rely on two data sets. The first one is the EIA data constructed by Baier and Bergstrand. It records EIA information of 195 countries over the period 1950-2012. The data set not only shows whether or not there is any EIA in force between two countries but also records EIAs by the level of aggregation. Specifically, EIAs are classified into six types: one-way preferential trade agreement, two-way preferential trade agreement, free trade agreement, customs union, common market, and economic union. The second data set is trade data constructed by Feenstra *et al.* (2005). It contains information of bilateral trade flows of 149 countries at 4-digit Standard International Trade Classification (SITC4) level in the period 1962-2000.

### 2.1 EIA Variables

To estimate the lasting effect of EIA on former member countries, we construct two dummy variables regarding the EIA status. The first one is  $EIA\_current_{jmt}$ , which takes the value of one if exporter  $j$  and importer  $m$  have an EIA in year  $t$ , and equals zero otherwise. The second variable is  $EIA\_past_{jmt}$ , which equals one if exporter  $j$  and importer  $m$  do not have an EIA in year  $t$ , but they once had an EIA in any year  $t' < t$ . This could be due to a termination of the EIA, or at least one of these countries leaves the agreement (like the Brexit case). These two binary variables together classify all observations (exporter-importer-year) in the sample into three categories: (1) country pairs ( $j-m$ ) that never have an EIA up to year  $t$  (including year  $t$ ) ( $EIA\_current_{jmt} = 0$  and  $EIA\_past_{jmt} = 0$ , which is the base group); (2) country pairs that have an EIA in year  $t$  ( $EIA\_current_{jmt} = 1$  and  $EIA\_past_{jmt} = 0$ ); and (3) country pairs that do not have an EIA in year  $t$ , but once had an EIA in any year prior to  $t$  ( $EIA\_current_{jmt} = 0$  and  $EIA\_past_{jmt} = 1$ ).<sup>6</sup> To be merged with the trade data, we choose 1961 as the starting year and drop EIAs that were already inactive by 1960.

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<sup>6</sup> For example, Poland and Hong Kong signed a preferential trade agreement in 1981, which was later terminated (became inactive) in 1989. In this example, they have  $EIA\_current = 0$  and  $EIA\_past = 0$  in the period 1961-1980. They have  $EIA\_current = 1$  and  $EIA\_past = 0$  in 1981-1988, and have  $EIA\_current = 0$  and  $EIA\_past = 1$  in 1989-2000 (the year 2000 is the end of our sample).

## 2.2 Trade Variables

The dependent variables in the estimations are trade flows between countries. To decompose the trade value into the extensive and intensive margins, we use the method proposed by Hummels and Klenow (2005) as in equations (1) – (3).<sup>7</sup>

$$EM_{jm} = \frac{\sum_{i \in I_{jm}} p_{kmi} x_{kmi}}{\sum_{i \in I} p_{kmi} x_{kmi}} \quad (1)$$

$$IM_{jm} = \frac{\sum_{i \in I_{jm}} p_{jmi} x_{jmi}}{\sum_{i \in I_{jm}} p_{kmi} x_{kmi}} \quad (2)$$

$$X_{jm} = \frac{\sum_{i \in I_{jm}} p_{jmi} x_{jmi}}{\sum_{i \in I} p_{kmi} x_{kmi}} = IM_{jm} EM_{jm} \quad (3)$$

Subscript  $j$  is the exporter,  $m$  is the importer,  $i$  is the product category (SITC4), and  $k$  is the reference country.<sup>8</sup>  $p_{kmi} x_{kmi}$  is the export value from exporter  $j$  to importer  $m$  of product  $i$ .  $I$  is the set of product categories in which the reference country has positive exports to  $m$ , and  $I_{jm}$  is a subset of these product categories in which country  $j$  has positive exports to  $m$ .  $EM_{jm}$  in equation (1) is the extensive margin of exporter  $j$  in import market  $m$ . It is the weighted number of product categories that  $j$  exports to  $m$  ( $i \in I_{jm}$ ), relative to the weighted number of product categories that the reference country  $k$  exports to  $m$  ( $i \in I$ ). The weight of each product category  $i$  is the export value that the reference country  $k$  exports to  $m$ , which represents the importance of product  $i$  in the market. An exporter has a greater  $EM$  if it exports more products (especially those with large weights), regardless the value that  $j$  exports.  $IM_{jm}$  in equation (2) is intensive margin. It is the value that  $j$  exports to  $m$ , relative to the value that  $k$  exports to  $m$  within the product categories that  $j$  has positive exports ( $i \in I_{jm}$ ). An exporter has a great  $IM$  if it has high export values within the products that it exports.  $X_{jm}$  in equation (3) is the ratio of exporter  $j$ 's total export value relative to the reference country's export value, which is the product of the extensive margin and the intensive margin.

<sup>7</sup> To simplify the notation, we suppress the subscript of year,  $t$ . But trade margins are calculated for every year in 1962-2000.

<sup>8</sup> Hummels and Klenow (2005) apply equations (1) – (3) to decompose the total trade with a cross-sectional data in 1995, so the reference country's export value is fixed. Foster *et al.* (2011) calculate the average export value of the reference country over the period 1962-2000, to make sure that the trade value of the reference country does not vary over time. The trade value of the reference country in the benchmark estimation of Baier *et al.* (2014) varies over time. In the sensitivity analysis, they also try to use only a fixed year (1995) or the chain-weighting technique to calculate the trade value of the reference country. We follow Foster *et al.* (2011) and use the average value cross 1962-2000 to calculate the reference country's exports value to country  $m$ .

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ln X	301798	-7.348147	3.207371	-19.57813	1.642056
ln EM	301798	-3.404137	2.15197	-17.92043	.946036
ln IM	301798	-3.94401	2.154904	-16.49767	2.995527
ln GDP <sub>i</sub>	293731	23.66699	2.236434	16.54197	29.96169
ln GDP <sub>m</sub>	293731	23.46654	2.328749	16.44905	29.96169
ln distance	301798	8.675515	.7788885	4.107106	9.892497
colony	301798	.0246059	.1549209	0	1
language	301798	.1714557	.3769073	0	1
EIA_current	301798	.2023108	.4017234	0	1
EIA_past	301798	.0064878	.0802852	0	1
EIA_past_short <sub>s=1</sub>	301798	.0007555	.0274755	0	1
EIA_past_short <sub>s=2</sub>	301798	.0015573	.0394324	0	1
EIA_past_short <sub>s=3</sub>	301798	.0022465	.0473444	0	1
EIA_past_short <sub>s=5</sub>	301798	.0036051	.0599339	0	1
EIA_past_long <sub>s&gt;1</sub>	301798	.0057323	.0754948	0	1
EIA_past_long <sub>s&gt;2</sub>	301798	.0049305	.070044	0	1
EIA_past_long <sub>s&gt;3</sub>	301798	.0042412	.0649867	0	1
EIA_past_long <sub>s&gt;5</sub>	301798	.0039397	.0626435	0	1

### 3 Empirical Model Specifications

#### 3.1 Trade Creation of EIA

As a starting point, we firstly estimate the trade creating effect of EIAs on the extensive and intensive margins, without considering the effect of past EIAs. The results could be compared with literature that studies how signing EIAs affect trade margins. We use the model specification as in equation (4) below, which follows the setting in Baier *et al.* (2014):

$$\ln Trade_{jmt} = \beta_0 + \beta_1 EIA\_current_{jmt} + \eta_{jm} + \delta_{jt} + \psi_{mt} + \varepsilon_{jmt} \quad (4)$$

The dependent variable,  $\ln Trade$ , is the trade margin defined in equations (1) – (3). Specifically, we run three regressions of model (4), and the dependent variable of each regression is the log of export share ( $\ln X$ ), extensive margin ( $\ln EM$ ), and intensive margin ( $\ln IM$ ), respectively. The key regressor is  $EIA\_current$ . We include the country pair fixed effect,  $\eta_{jm}$ , which controls for all variables that are specific to exporter-importer and do not change over time. This means that variables in standard gravity models such as the distance, common language, and common border *et al.* are dropped out in our model. To account for the issue of multilateral resistance as discussed in Anderson and van Wincoop (2003), we include the exporter-year fixed effect  $\delta_{jt}$  and the importer-year fixed effect  $\psi_{mt}$  to control for changes in GDP and multilateral price terms.  $\varepsilon_{jmt}$  is the error term. A characteristic of these estimations is that we can decompose the influence of each regressor on total export ratio  $X$  into the extensive and intensive margins. This is because in equation (3),  $X = EM \times IM$ , so once taking logs on them we have  $\ln X = \ln EM +$



ln  $IM$ . When we estimate model (4) using OLS, the coefficients in the regression of ln  $X$  will be decomposed linearly into that of ln EM and ln IM. Thus we can calculate the relative contribution of each margin regarding each explanatory variable. The estimated coefficient  $\beta_1$  shows the difference performance in trade of two countries with an EIA and that of countries that do not have an EIA, holding other things equal (by controlling for the fixed effects).

### 3.2 The Lasting Effect of Past EIA

Next, we investigate the lasting effect of EIA on trade performance by adding  $EIA\_past_{jmt}$  into model (4). As specified in section 2.1, this variable takes the value of one if country  $j$  and  $m$  have an EIA in any period before  $t$  but do not have an EIA in period  $t$ .

$$\ln Trade_{jmt} = \beta_0 + \beta_1 EIA\_current_{jmt} + \beta_2 EIA\_past_{jmt} + \eta_{jm} + \delta_{jt} + \psi_{mt} + \varepsilon_{jmt} \quad (5)$$

As explained in section 2.1, once the two dummy variables are included in the model, observations in the sample are classified into three groups, with the base group being country pairs that never have an EIA. The signs of  $\beta_1$  and  $\beta_2$  show the different trade performance between country pairs with different EIA relationships. For example, a positive  $\beta_1$  in the extensive margin regression means that country pairs that are currently in an active EIA have a greater extensive margin than country pairs that never have an EIA.

### 3.3 The Short Run and Long Run Effects of Past EIA

Although the trade creation effect of EIAs does not completely disappear after the termination of an agreement, it may persist only for certain period of time and then fade out eventually. To investigate this pattern, we further separate the lasting effect of EIAs into the short-run effect and the long-run effect. The model specification is:

$$\ln Trade_{jmt} = \beta_0 + \beta_1 EIA\_current_{jmt} + \beta_2 EIA\_past\_short_{jmt} + \beta_3 EIA\_past\_long_{jmt} + \eta_{jm} + \delta_{jt} + \psi_{mt} + \varepsilon_{jmt} \quad (6)$$

In the benchmark, we choose two years as the cutoff between the short-run and long-run effects.<sup>9</sup> The  $EIA\_past_{jmt}$  variable in model (5) is replaced by  $EIA\_past\_short_{jmt}$  and  $EIA\_past\_long_{jmt}$ . The  $EIA\_past\_short_{jmt}$  dummy

<sup>9</sup> In section 5.2, we also use alternative cutoffs (at one year, three years, and five years) to define the short-run and long-run. The main findings of the benchmark estimation remain consistent in these cases. Although the time span of our sample is 1962-2000, we do not choose a larger cutoff because it will greatly reduce the sample size and the variation in the  $EIA\_past\_long$  variable. For instance, if we set the cutoff at ten years, we cannot observe the long-run effect of all EIAs that were terminated after 1990, which accounts for a large share of observations in the sample.

variable takes the value of unity in the first two years that the EIA is broken. The  $EIA\_past\_long_{jmt}$  dummy variable equals one if the EIA relationship has been broken for more than two years. Specifically,  $EIA\_past\_short_{jmt} = 1$  if  $EIA\_current_{jmt} = 0$  and  $EIA\_current_{jm,t-s} = 1$  for any  $s = 1, 2$ .  $EIA\_past\_long_{jmt} = 1$  if  $EIA\_current_{jm,t-s} = 0$  for  $s = 0, 1, 2$ ; and  $EIA\_current_{jm,t-s} = 1$  for any  $s \geq 3$ . Our interest in this case is the estimated coefficients  $\beta_2$  and  $\beta_3$ , which show the lasting effect of past trade agreements in the short run and in the long run.

#### 4 Estimated Results

The estimates of model (4) are presented in Table 2. The coefficients confirm the positive trade creation effect of EIAs. Countries that have an EIA trade more with each other than countries that do not (including those never have an EIA and those have an EIA in the past). Column (1) shows that in an importing country, the export share of an EIA partner is about 2.7% greater than that of a non-member, holding other things equal. The positive effect occurs in the intensive margin but not in the extensive margin. Member countries export 3.4% greater values than non-members do (column 3), while the difference in the extensive margin is not significant. This finding is similar to that in Baier *et al.* (2014), in which they find the greater trade values between EIA members are driven by the intensive margin more than the extensive margin.

**Table 2. The Effect of Current EIAs on Trade**

VARIABLES	(1) lnX	(2) lnEM	(3) lnIM
EIA_current	0.0269* (0.0159)	-0.00663 (0.0126)	0.0335** (0.0148)
Constant	-7.354*** (0.00396)	-3.403*** (0.00314)	-3.951*** (0.00367)
Observations	301,798	301,798	301,798
R-squared	0.859	0.802	0.730
Exporter_Year FE	YES	YES	YES
Importer_Year FE	YES	YES	YES
Country_Pair FE	YES	YES	YES

Note: Standard errors are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

We then estimate model in equations (5), which includes the past-EIA dummy variable to evaluate the effect of inactive EIAs on trade. The estimates are reported in Table 3. Note that the base group in these estimations is country pairs that never have an EIA. In column (1), EIA members export 4.6% more than countries that never have an EIA. The intensive margin accounts for a dominant share of this effect (95%),<sup>10</sup> and the contribution of the extensive margin is small and insignificant. The

<sup>10</sup> This number is calculated from 0.435/0.459=95%.

more interesting results are coefficients on past EIA relationships. We find a strong lasting effect of EIA: although countries are no longer in the same EIA, their past EIA experience persists and still raises the trade values between countries. Former EIA members export 12.9% more, with a 6.1% higher extensive margin and 6.8% higher intensive margin. In the search model, buyers and the supplier of these former member countries have already successfully matched up when EIAs are still active. If the buyers decide to switch to other suppliers in a different country after the trade agreement is broken, they must pay the search costs again and try to find new suppliers that might not be a good match. So buyers tend to trade with the old suppliers even after the EIA becomes inactive. But even we accept that past EIA experience can increase trade, it is still quite surprising that this trade creation effect is stronger than that of current EIAs.<sup>11</sup> An explanation is that it takes time for an EIA to have its full impact. Baier *et al.* (2014) show that it takes 10-15 years for an EIA to have its full impacts. So a newly signed EIA may not have strong trade creation effect. On the contrary, EIA with a long history could have a stronger lasting effect even after it becomes inactive.

**Table 3. The Effects of Current and Past EIAs on Trade**

VARIABLES	(1) lnX	(2) lnEM	(3) lnIM
EIA_current	0.0459*** (0.0172)	0.00241 (0.0136)	0.0435*** (0.0160)
EIA_past	0.129*** (0.0436)	0.0611* (0.0346)	0.0676* (0.0404)
Constant	-7.358*** (0.00426)	-3.405*** (0.00338)	-3.953*** (0.00396)
Observations	301,798	301,798	301,798
R-squared	0.859	0.802	0.730
Exporter_Year FE	YES	YES	YES
Importer_Year FE	YES	YES	YES
Country_Pair FE	YES	YES	YES

Note: Standard errors are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Finally, we explore the short-run and long-run effects after EIA relationship is terminated. We estimate the model in equation (6), and present the results in Table 4. Coefficients on current EIAs are similar to that in Table 3. Trade increases by 4.6%. The intensive margin accounts for 95% of this influence, and the extensive margin does not increase significantly. The lasting effect of past EIAs has a large difference in the short run than in the long run. In the first two years that an EIA becomes inactive, member countries trade 23.1% more than countries that never have an EIA, and this difference takes place mainly in the extensive margin while the coefficient in the intensive margin regression is statistically insignificant. Starting from the third year since the EIA turns inactive, the trade creating effect decreases from 23.1% to 8.8%, which is only about one third of the short run effect. So although past EIA

<sup>11</sup> We carry out a F-test and find that the coefficient on *EIA\_current* is significantly different from that on *EIA\_past*.

partnerships still increases trade, the magnitude decreases as time passes. According to the search model, EIAs can only help keeping existing trade relationships but not building new ones. So their trade promoting effect will fade out as existing business relationships die eventually.

**Table 4. The Long Run and Short Run Lasting Effects of Past EIAs**

VARIABLES	(1) lnX	(2) lnEM	(3) lnIM
EIA_current	0.0454*** (0.0172)	0.00205 (0.0136)	0.0433*** (0.0160)
EIA_past_short <sub>s&lt;2</sub>	0.231*** (0.0683)	0.129** (0.0542)	0.103 (0.0634)
EIA_past_long <sub>s&gt;2</sub>	0.0877* (0.0484)	0.0342 (0.0384)	0.0535 (0.0449)
Constant	-7.358*** (0.00426)	-3.405*** (0.00338)	-3.953*** (0.00396)
Observations	301,798	301,798	301,798
R-squared	0.859	0.802	0.730
Exporter_Year FE	YES	YES	YES
Importer_Year FE	YES	YES	YES
Country_Pair FE	YES	YES	YES

Note: Standard errors are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

The empirical evidence of this section can be summarized as follows. First, active EIA increases trade flows among member countries, which mainly concentrates on the intensive margin. Second, past trade agreements still contribute to increasing trade between countries, but the effect is more significant in the extensive margin than in the intensive margin. Third, this lasting trade promoting effect of EIA sustains in the short run, but eventually it disappears in the long run.

## 5 Robustness Checks and Extensions

In this section, we conduct a series of estimations to show that the findings in the benchmark model are robust to alternative model specifications and variable measurements.

### 5.1 Multilateral Resistance and Trade Diversion

Our empirical models in section 3 exploit the panel data and control for the country pair fixed effects. Covariates that are time-invariant to each country pair, such as distance, common language, etc., are dropped out. In addition, we also include the exporter-year and importer-year fixed effects to address the issue of multilateral resistance as discussed in Anderson and van Wincoop (2003). This issue is especially important in studies of EIAs, since the multilateral resistance also contains the trade diversion effect.<sup>12</sup> To examine the importance of accounting for

<sup>12</sup> The trade volume between  $j$  and  $m$  would be lower if the exporter  $j$  or importer  $m$  has EIAs with countries other than  $j$  and  $m$ . This trade diversion effect is controlled once the exporter-year and importer-year fixed effects are included.

the multilateral resistance and the trade diversion effect, we adopt a different model specification by including the exporter, importer, and year fixed effects (instead of the exporter-year, importer-year, and country-pair fixed effects). So we can add standard gravity control variables, including the country size, distance, common language, and colony history back into the model. The models in (4) – (6) now become:

$$\begin{aligned} \ln Trade_{jmt} = & \beta_0 + \beta_1 EIA\_current_{jmt} + \lambda_1 \ln GDP_{jt} + \lambda_2 \ln GDP_{mt} \\ & + \lambda_3 \ln distance_{jm} + \lambda_4 language_{jm} + \lambda_5 colony_{jm} + \mu_j \\ & + \theta_m + \sigma_t + \varepsilon_{jmt} \end{aligned} \quad (7)$$

$$\begin{aligned} \ln Trade_{jmt} = & \beta_0 + \beta_1 EIA\_current_{jmt} + \beta_2 EIA\_past_{jmt} + \lambda_1 \ln GDP_{jt} \\ & + \lambda_2 \ln GDP_{mt} + \lambda_3 \ln distance_{jm} + \lambda_4 language_{jm} \\ & + \lambda_5 colony_{jm} + \mu_j + \theta_m + \sigma_t + \varepsilon_{jmt} \end{aligned} \quad (8)$$

$$\begin{aligned} \ln Trade_{jmt} = & \beta_0 + \beta_1 EIA\_current_{jmt} + \beta_2 EIA\_past\_short_{jmt} \\ & + \beta_3 EIA\_past\_long_{jmt} \\ & + \lambda_1 \ln GDP_{jt} + \lambda_2 \ln GDP_{mt} + \lambda_3 \ln distance_{jm} \\ & + \lambda_4 language_{jm} + \lambda_5 colony_{jm} + \mu_j + \theta_m + \sigma_t + \varepsilon_{jmt} \end{aligned} \quad (9)$$

Estimates are stored in Table 5. Gravity model control variables all have expected signs: GDP, common language, and colony history raise trade values between countries, while distance reduces them. Coefficients on EIAs are somewhat different from that in Tables 2 – 4. First, current agreements still expand trade values but now mainly along the extensive margin. Second, the long-run effect is stronger than the short-run effect and even than the current agreements. The findings confirm that controlling the country-pair and the multilateral resistance is indeed important, as verified in the empirical literature (e.g., Redding and Venable, 2004; Baier and Bergerstrand, 2007; Olivero and Yotov, 2012; Baier *et al.*, 2017). The bottom line is that the both current and past trade agreements still have a positive effect on overall trade between countries.

Table 5. The Gravity Mode Specification

VARIABLES	(1) lnX	(2) lnEM	(3) lnIM	(4) lnX	(5) lnEM	(6) lnIM	(7) lnX	(8) lnEM	(9) lnIM
EIA_current	0.194*** (0.0122)	0.285*** (0.00934)	-0.0909*** (0.00987)	0.219*** (0.0123)	0.321*** (0.00944)	-0.101*** (0.00998)	0.220*** (0.0123)	0.321*** (0.00944)	-0.101*** (0.00998)
EIA_past				0.604*** (0.0444)	0.870*** (0.0339)	-0.250*** (0.0359)			
EIA_past_short <sub>t-2</sub>							0.251*** (0.0867)	0.759*** (0.0666)	-0.508*** (0.0704)
EIA_past_long <sub>t-2</sub>							0.741*** (0.0505)	0.906*** (0.0388)	-0.165*** (0.0410)
lnGDP <sub>j</sub>	0.496*** (0.00964)	0.317*** (0.00741)	0.179*** (0.00783)	0.493*** (0.00968)	0.316*** (0.00740)	0.179*** (0.00783)	0.495*** (0.00964)	0.316*** (0.00740)	0.179*** (0.00783)
lnGDP <sub>m</sub>	0.560*** (0.00949)	0.443*** (0.00729)	0.117*** (0.00770)	0.559*** (0.00952)	0.442*** (0.00728)	0.117*** (0.00770)	0.560*** (0.00948)	0.443*** (0.00728)	0.117*** (0.00770)
Indistance	-1.225*** (0.00541)	-0.867*** (0.00416)	-0.358*** (0.00439)	-1.208*** (0.00544)	-0.861*** (0.00416)	-0.359*** (0.00440)	-1.221*** (0.00542)	-0.861*** (0.00416)	-0.359*** (0.00440)
language	0.555*** (0.0112)	0.538*** (0.00861)	0.0167* (0.00910)	0.682*** (0.0109)	0.530*** (0.00860)	0.0189** (0.00910)	0.549*** (0.0112)	0.530*** (0.00860)	0.0187** (0.00910)
colony	1.205*** (0.0249)	0.630*** (0.0191)	0.575*** (0.0202)		0.633*** (0.0191)	0.574*** (0.0202)	1.207*** (0.0249)	0.633*** (0.0191)	0.574*** (0.0202)
Constant	-21.73*** (0.330)	-13.92*** (0.253)	-7.803*** (0.267)	-21.79*** (0.331)	-13.96*** (0.253)	-7.793*** (0.267)	-21.75*** (0.329)	-13.96*** (0.253)	-7.796*** (0.267)
Observations	293,731	293,731	293,731	293,731	293,731	293,731	293,731	293,731	293,731
R-squared	0.678	0.581	0.531	0.676	0.581	0.531	0.678	0.581	0.531
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Exporter FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Importer FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors are in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 5.2 Cutoffs of the Short Run and the Long Run

In the benchmark estimations, we cut the short-run and long-run at the year of two. To check if our estimations are robust to the selection of other length of time, we use one, three and five years as the cutoff and estimate model (6) again. Columns (1) – (3), (4) – (6), and (7) – (9) in Table 6 are the estimates of setting the cutoff at one year, three years, and five years, respectively. The lasting effects of EIA exist in all cases, and the short-run effect is greater than the long-run effect, which is consistent with that in the benchmark estimations.

**Table 6. Different Cutoff Years between the Short Run and the Long Run**

VARIABLES	(1) lnX	(2) ln EM	(3) ln IM	(4) lnX	(5) ln EM	(6) ln IM	(7) lnX	(8) ln EM	(9) ln IM
EIA_current	0.0457*** (0.0172)	0.00235 (0.0136)	0.0433*** (0.0160)	0.0454*** (0.0172)	0.00209 (0.0136)	0.0433*** (0.0160)	0.0553*** (0.0168)	0.0149 (0.0134)	0.0404*** (0.0156)
EIA_past_short <sub>t-1</sub>	0.238** (0.0938)	0.0900 (0.0745)	0.148* (0.0871)						
EIA_past_long <sub>t-2</sub>	0.110** (0.0457)	0.0563 (0.0363)	0.0541 (0.0424)						
EIA_past_short <sub>t-3</sub>				0.208*** (0.0587)	0.108** (0.0466)	0.100* (0.0545)			
EIA_past_long <sub>t-3</sub>				0.0750 (0.0511)	0.0296 (0.0406)	0.0454 (0.0475)			
EIA_past_short <sub>t-5</sub>							0.216*** (0.0493)	0.191*** (0.0391)	0.0247 (0.0458)
EIA_past_long <sub>t-5</sub>							0.206*** (0.0506)	0.119*** (0.0401)	0.0868* (0.0470)
Constant	-7.358*** (0.00426)	-3.405*** (0.00338)	-3.953*** (0.00396)	-7.358*** (0.00426)	-3.405*** (0.00338)	-3.953*** (0.00396)	-7.361*** (0.00420)	-3.408*** (0.00333)	-3.953*** (0.00390)
Observations	301,798	301,798	301,798	301,798	301,798	301,798	301,798	301,798	301,798
R-squared	0.859	0.802	0.730	0.859	0.802	0.730	0.859	0.802	0.730
Exporter_Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Importer_Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country_pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 5.3 Lasting Effect by the Type of Agreements

In trade literature (e.g., Baier *et al.*, 2014; Limão, 2016), the trade creation effect increases with the level of integration of agreements. This variation may also prevail in the lasting effects of EIA. We categorize EIA into four groups following the classification in Baier *et al.* (2014): one-way preferential trade agreement (OWPTA), two-way preferential trade agreement (TWPTA), free trade agreement (FTA), and custom union, common market, and economic integration agreement (CUCMEIA). We estimate the models in equations (4) – (6), including a binary variable for each type of EIA separately. Columns (1) – (3) of Table 7 are the estimates of model (4). The deepest integration (CUCMEIA) increases trade by 88%, followed by free trade agreement (FTA) which increases trade by 29%,<sup>13</sup> and then two-way preferential trade agreements (TWPTA) by 9%. This order is reasonable and is consistent with that in Baier *et al.* (2014).<sup>14</sup>

<sup>13</sup>  $e^{0.63} - 1 = 0.88$ ,  $e^{0.26} - 1 = 0.29$ .

<sup>14</sup> We find that coefficients on one-way preferential trade agreements (OWPTA) are negative. In fact, Baier *et al.* (2014) also find that the less integrated agreements (one-way and two-way preferential trade agreements) have negative influence on trade flows, relative to country pairs that have no agreement. Their explanation is that the time these agreements start prevailing overlaps with the time that intra-industry trade surges. Since intra-industry trade is more concentrated among developed countries, and OWPTA are usually signed between a developed country and a developing country, the estimated of OWPTA will be biased downward.

Columns (4) – (6) report estimates of lasting EIA affect in model (5), and columns (7) – (9) show that in model (6). Among the four types of agreements, FTA has no record of termination in our sample, and thus we cannot estimate its lasting effect.<sup>15</sup> The results demonstrate that the lasting effect does not always increases with the level of integration. The deepest integration (CUCMEIA) has the greatest positive lasting effect in both the short run and the long run, followed by the shallowest integration (OWPTA).

**Table 7. The Lasting Effect of EIA by the Level of Integration**

VARIABLES	(1) lnX	(2) lnEM	(3) lnIM	(4) lnX	(5) lnEM	(6) lnIM	(7) lnX	(8) lnEM	(9) lnIM
OWPTA_current	-0.141*** (0.0205)	-0.0894*** (0.0163)	-0.0511*** (0.0190)	-0.112*** (0.0223)	-0.0732*** (0.0177)	-0.0392* (0.0207)	-0.113*** (0.0223)	-0.0736*** (0.0177)	-0.0394* (0.0207)
TWPTA_current	0.0921*** (0.0265)	0.0200 (0.0211)	0.0720*** (0.0247)	0.0864*** (0.0271)	0.00717 (0.0215)	0.0792*** (0.0252)	0.0856*** (0.0271)	0.00660 (0.0215)	0.0790*** (0.0252)
FTA_current	0.255*** (0.0261)	0.124*** (0.0207)	0.131*** (0.0242)	0.268*** (0.0266)	0.122*** (0.0211)	0.146*** (0.0247)	0.267*** (0.0266)	0.122*** (0.0212)	0.145*** (0.0247)
CUCMEIA_current	0.633*** (0.0390)	0.147*** (0.0310)	0.486*** (0.0362)	0.666*** (0.0404)	0.149*** (0.0320)	0.517*** (0.0375)	0.665*** (0.0404)	0.149*** (0.0320)	0.516*** (0.0375)
OWPTA_past				0.154*** (0.0482)	0.113*** (0.0383)	0.0407 (0.0448)			
TWPTA_past				-0.434*** (0.130)	-0.459*** (0.104)	0.0251 (0.121)			
CUCMEIA_past				0.377** (0.156)	-0.160 (0.124)	0.537*** (0.145)			
OWPTA_past_short <sub>t-2</sub>							0.178** (0.0750)	0.110* (0.0596)	0.0679 (0.0697)
TWPTA_past_short <sub>t-2</sub>							-0.174 (0.210)	-0.257 (0.167)	0.0835 (0.195)
CUCMEIA_past_short <sub>t-2</sub>							0.857*** (0.261)	0.248 (0.207)	0.609** (0.242)
OWPTA_past_long <sub>t-2</sub>							0.144*** (0.0543)	0.115*** (0.0431)	0.0290 (0.0504)
TWPTA_past_long <sub>t-2</sub>							-0.514*** (0.140)	-0.521*** (0.111)	0.00715 (0.130)
CUCMEIA_past_long <sub>t-2</sub>							0.289* (0.161)	-0.235* (0.128)	0.524*** (0.149)
Constant	-7.343*** (0.00412)	-3.396*** (0.00327)	-3.947*** (0.00383)	-7.348*** (0.00450)	-3.398*** (0.00357)	-3.950*** (0.00418)	-7.348*** (0.00450)	-3.398*** (0.00358)	-3.950*** (0.00418)
Observations	301,798	301,798	301,798	301,798	301,798	301,798	301,798	301,798	301,798
R-squared	0.859	0.802	0.730	0.859	0.802	0.730	0.859	0.802	0.730
Exporter_Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Importer_Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country_pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 5.4 Lagged Explanatory Variables

In the literature of trade agreements (such as Mansfield and Bornson, 1997; Mansfield and Reinhardt, 2003; Buthe and Milner, 2008; Baldwin and Jaimovich, 2012; and Dur *et al.*, 2014), EIA variables are lagged by one period to avoid the endogeneity problem induced by reverse causality or simultaneity. For instance, if a country experiences a surge in imports in period  $t$ , it may terminate its trade agreement as a protection measure, which makes the EIA status in period  $t$  endogenous. Nevertheless, EIA status in period  $t-1$  is exogenous, because trade performance in period  $t$  cannot change the EIA status in the past periods. We lag all EIA dummy variables in models (4) – (6) by one period, and report the estimates in Table 8. Current agreements still increase the intensive margin of trade. Although coefficients of past EIA are not significant in columns (4) – (6) (corresponding to the model in equation (5)), it is significant in the short run once we split the short-

<sup>15</sup> In cases where the same country pair has different agreement types in different years, the lasting effect is classified by the year that the agreement is terminated.



run and long-run effects. The bottom line is that we are confident about the lasting effect of EIA within a few years after agreements become inactive.

**Table 8. Lag EIA Variables**

VARIABLES	(1) lnX	(2) lnEM	(3) lnIM	(4) lnX	(5) lnEM	(6) lnIM	(7) lnX	(8) lnEM	(9) lnIM
EIA_current <sub>t-1</sub>	0.0206 (0.0158)	-0.0135 (0.0123)	0.0341** (0.0145)	0.0297* (0.0171)	-0.00668 (0.0132)	0.0364** (0.0156)	0.0293* (0.0171)	-0.00690 (0.0132)	0.0362** (0.0156)
EIA_past <sub>t-1</sub>				0.0618 (0.0433)	0.0463 (0.0336)	0.0155 (0.0396)			
EIA_past_short <sub>t-1,s≤2</sub>							0.129* (0.0656)	0.0831 (0.0509)	0.0455 (0.0600)
EIA_past_long <sub>t-1,s&gt;2</sub>							0.0314 (0.0488)	0.0295 (0.0378)	0.00192 (0.0446)
Constant	-7.027*** (0.00403)	-3.154*** (0.00313)	-3.872*** (0.00369)	-7.029*** (0.00434)	-3.156*** (0.00337)	-3.873*** (0.00397)	-7.029*** (0.00434)	-3.156*** (0.00337)	-3.873*** (0.00397)
Observations	263,121	263,121	263,121	263,121	263,121	263,121	263,121	263,121	263,121
R-squared	0.868	0.820	0.756	0.868	0.820	0.756	0.868	0.820	0.756
Exporter_Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Importer_Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country_pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 5.5 Constructing Trade Values at the Product Level

In the sample of our paper, we calculate the extensive and the intensive margin margins following the methodology in Hummels and Klenow (2005). This procedure will collapse the product level trade data into the country level. As a robustness check, we use the original bilateral trade values as the dependent variable, without calculating the two margins, to construct an alternative sample. In this case, each observation in the sample is the log trade value,  $\ln V_{jms,t}$ , where subscription  $j$  is exporter,  $m$  is importer,  $s$  is product (SITC4), and  $t$  is year. The empirical models are also adjusted accordingly, with the country-pair (exporter-importer) fixed effects being replaced by the exporter-importer-product fixed effects. The estimates in Table 9 again show that the main conclusion of the benchmark estimations persist using the product-level trade data.

**Table 9. Trade Data at the Product (SITC4) Level**

VARIABLES	(1) lnValue	(2) lnValue	(3) lnValue
EIA_current <sub>t-1</sub>	0.184*** (0.00233)	0.209*** (0.00249)	0.209*** (0.00249)
EIA_past <sub>t-1</sub>		0.186*** (0.00643)	
EIA_past_short <sub>t-1,s≤2</sub>			0.196*** (0.00835)
EIA_past_long <sub>t-1,s&gt;2</sub>			0.179*** (0.00747)
Constant	5.354*** (0.000771)	5.344*** (0.000843)	5.344*** (0.000844)
Observations	10,992,738	10,992,738	10,992,738
R-squared	0.842	0.842	0.842
Exporter_Year FE	YES	YES	YES
Importer_Year FE	YES	YES	YES
Country_pair_product FE	YES	YES	YES

Note: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 6 Conclusion

Trade agreements take an important role in global trade and international negotiations. As more and more countries join trade agreements, there are also countries withdrawal from or terminate existing ones. On the one hand, trade agreements lower trade barriers and raise trade flows as well as countries' welfare and efficiency. On the other hand, these agreements may diverse trade from low-cost non-member countries to high-cost member countries, and this trade diversion effect decreases welfare. Countries may also terminate these agreements to protect domestic markets and to solve the problems of unemployment, illegal migration, etc. While there is also an increasing number of trade agreements being terminated, studies analyzing the impacts of past partnerships are scant. The objective of this paper is to provide empirical evidence to fill this gap.

The estimated results show that the trade creating effect of EIAs persists even after the agreements are canceled. The finding is consistent with the prediction of the search model in trade, in which buyers have to pay a search cost before they can find a supplier, and have to make an initial investment to learn about the ability of the supplier. So if EIAs help buyers to build trade relationships, these relationships will tend to sustain after the agreements are terminated, since finding a new supplier can cost even more. We also find that the lasting effect of EIAs decreases in magnitude as time passes. The positive effect of past EIA partnerships becomes only marginally significant after the second year of termination, and the magnitude is cut to about one-third. These findings are robust to different model specifications, measures of variables, and cutoffs between the short run and long run. We hope that the results of this paper can help policy makers when evaluating consequences of leaving or terminating an EIA (such as Brexit), and can shed light on future studies seeking to have a more complete understanding about trade agreements.

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