Trade Integration and the Fragility of Trade Relationships

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Abstract

We investigate the effect of economic integration agreements on the stability of international trade at the 4-digit SITC level. Using annual trade data for over 180 countries from 1962 to 2005 we examine how economic integration agreements affect the length of trade relationships, the volume at the start of new trade relationships, and how quickly trade grows within a relationship. We find evidence of an interesting dichotomy which highlights the relevance of transaction costs for exports. While economic integration increases the length of trade relationships which started prior to the agreement, it reduces the length of those started after the agreement. Similarly, economic integration increases the growth rate of relationships which started prior to the agreement, but decreases the growth rate of those that started after the agreement. With respect to starting size of trade relationships, economic integration lowers initial transaction volumes.

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1 Introduction

A large and still growing literature aims to examine the effects of economic integration agreements (EIAs) on trade. While a removal of trade barriers can generally be expected to increase trade, the economic effects of formal arrangements are a matter of much empirical debate. An obvious difficulty is that patterns of trade in the absence of the agreement are unknown such that a counterfactual has to be constructed, based on assumptions. In practice many studies follow Tinbergen (1962) and apply a gravity framework: holding constant for standard determinants of trade (such as the size of the trading partners and the distance between them), a dummy variable that is one if both countries are members of an EIA is intended to capture the extent to which actual trade between partners deviates from the gravity benchmark. Frankel (1997) provides an extensive discussion and application of this approach. In the empirical implementation, however, the results turn out to be highly sensitive to the exact estimation specification. For instance, Baier and Bergstrand (2007), among others, apply panel techniques to take explicitly into account that countries do not select randomly into EIAs, reporting larger and more precise estimates. They estimate that free trade agreements, on average, double trade between member countries.

Another issue is aggregation. Economic integration agreements differ widely in depth and scope. While some studies, such as Carrère (2006) and Kohl (2012), allow for differences across individual arrangements, others estimate an average effect, based on a single dummy variable for all arrangements. Similarly, timing may matter for the results. Allowing for time–variant effects, Magee (2008) provides evidence for anticipation effects, while Baier and Bergstrand (2007) emphasize that free trade agreements are phased–in, typically over a 10 year period.[1] Finally, the vast majority of research focuses on aggregate trade patterns, thereby ignoring potential effects of

[1]Or to be more precise, while the phase–in provisions embodied in such agreements vary across agreements, Baier and Bergstrand (2007) find that it takes about ten years for the full effect of an agreement to manifest itself in trade flows.

EIAs on the extensive margin of trade. For instance, Anderson and Yotov (2011), while confirming the aggregate estimates of Baier and Bergstrand (2007), report large differences across sectors. While formal arrangements typically liberalize trade across all sectors, the literature seems to be primarily concerned with the overall effect on trade. More comprehensively, Baier, Bergstrand, and Feng (2011) show that EIAs have time–dependent effects on the intensive and extensive margins, with the extensive margin becoming more important with time.

In this paper we analyze the effects of EIAs at a very disaggregated level. The object of our investigation is a trade relationship defined as a pair of countries exchanging a product, for example, Argentina exporting beef to the United States. We use the Nguyen (2012) model with foreign demand uncertainty to motivate our investigation. The model allows for a firm's exports to vary across destinations in exports to as well as providing for an endogenous probability of export failures as the demand uncertainty is resolved only *after* the firm exports to a particular destination. The model allows us to differentiate between the effect of a trade agreement on currently active exports between the parties to the agreement and those which start after the agreement. The model suggests that a trade agreement will have a beneficial effect on products actively exported when the agreement takes effect, in the form of a lower hazard of exports ceasing as well as larger growth rates. We can expect the effect on products which begin to be exported in the wake of the agreement to be the opposite. These products, given their marginal nature of not having been exported prior to the agreement, will experience a larger hazard, lower growth rates, and lower initial volumes.

We investigate three aspects of trade relationships: the uninterrupted length or duration, the growth rate of the volume of trade, and the volume with which a relationship commences. To investigate the duration of trade relationships we estimate a hazard model, as has become common in the duration of trade literature (see Besedeš

and Prusa 2006b, Nitsch 2009, and Besedeš and Prusa 2012). While it may be more natural to begin with initial trade volumes, there are important aspects of the timing of the effects of economic integration agreements which are best illustrated analyzing a measure which takes into account the complete history of a relationship spanning the starting point of an agreement. Our discussion of the effects on the hazard and the growth of trade volumes will show that being precise about the timing of the agreement vis–à–vis a trade relationship is of critical importance to understanding their effects.

Much research has recently been devoted to investigating duration of trade and determinants of the hazard of trade relationships ceasing. Besedeš and Prusa (2006a,b) first showed that U.S. imports relationship are predominantly of short duration and that duration depends on the nature of the product traded with differentiated goods exhibiting a lower hazard than homogeneous goods. Subsequent research has shown that short duration is a universal characteristic, irrespective of whether product– or firm–level data are used or which country's relationships are examined. Using product–level data, Nitsch (2009) showed German imports were of short duration, Jaud, Kukenova, and Strieborny (2009) showed that exports of a large set of countries are similarly short, while Besedeš and Prusa (2011) and Carrère and Strauss-Khan (2012) showed the same for a large set of developing countries. Görg, Kneller, and Muraközy (2012) arrived to similar results using Hungarian firm–level export data as do Cadot et al. (2013) for firm–level exports of four African nations. More recently this literature has turned to examine the effect of trade policy on the hazard of trade ceasing. Besedeš (forthcoming) showed that NAFTA had a differential effect on the hazard of the three members' exports ceasing. Besedeš and Prusa (2012) showed that, at least in the case of the U.S., antidumping increases the hazard of trade ceasing in an economically significant way.

Most similar to our work in terms of the hazard effects is Kamuganga (2012) who

showed that regional trade cooperation within Africa reduces the hazard of exports ceasing across all types of agreements. Unlike our work, he specified a single dummy to identify the existence of an agreement. As we show below, the effect of an agreement critically depends on whether the affected trade relationship started *before* or *after* the agreement. As a result our preferred specification includes several dummies to precisely identify all aspects of the timing of the effect of an agreement. In addition, our effort differs in methodology as Kamuganga (2012) uses the semiparametric Cox proportional hazard model, which has been shown to be ill–equipped to handle discrete data most common in trade applications (see Hess and Person 2012). We use random effects probit to estimate the hazard.

The growth of trade while a relationships is active has been examined in several studies. Araujo, Mion, and Ornelas (2011) use Belgian firm–level data to show that countries with weaker institutions experience faster growth of exports from a given exporter. Besedeš, Kim, and Lugovskyy (2012) show that more credit constrained exporters have faster growing relationships, conditional on survival. Their focus is on examining the effect of credit constraints without examining the effect of economic integration agreements. Our effort in this paper is much simpler in nature as we simply investigate the correlation between economic integration agreements, their starting point, and the growth of the volume, without providing a rigorous theoretical mechanism for the underlying effects.

Unlike the issue of the hazard of trade ceasing, the other two elements of our investigation have not been studied as extensively. Besedeš and Prusa (2006b) is one of a few papers to study the initial volume of trade at the start of a relationship, showing that differentiated goods start with lower volumes, while Besedeš (2008) was the first to systematically investigate how initial volumes affect the hazard, showing that larger initial volumes are associated with longer lasting relationships and lower

hazard rates.[2] In this paper we provide a novel analysis of how economic integration agreements affect the initial volume of trade.

To conduct our investigation we use annual 5–digit SITC revision 1 imports data between 1962 and 2005 as recorded by UN's Comtrade Database for all importers in the database. We use data as reported by importers given their widely perceived greater accuracy. We combine the trade flow data with the Database on Economic Integration Agreements data constructed by Scott Baier and Jeffrey Bergstrand (2007). The database provides bilateral information on the existence of economic integration agreements annually between 1950 and 2005.

Our results illustrate that to fully understand the effects of economic integration agreements on product–level patterns of trade, it is of crucial importance to carefully take into account the timing of the agreement relative to the timing of trade relationships. To be more precise, we must carefully specify when an agreement begins and whether a trade relationship started before or after the agreement. In terms of the hazard of trade ceasing, using a single dummy variable to identify when an agreement is in effect results in an increased hazard in the wake of the agreement. However, adding a dummy identifying relationships which start *after* the agreement indicates a dichotomy in the agreement's effect. Relationships which started *before* the agreement receive a boost in the form of a *reduced* hazard, while those that start *after* the agreement face a *higher* hazard than those starting before. In addition, when we include a variable indicating how long an agreement has been in place, we find that the longer the agreement has been in place the higher the hazard faced by all active trade relationships.

Our results for growth rates and initial volumes are equally interesting. Results for the growth of trade are parallel to those for the hazard of trade ceasing. A single

[2]Most papers investigating the hazard of trade ceasing use the initial volume as an explanatory variable for the hazard reflecting a relationship's initial conditions, but few papers focus on understanding the determinants of the initial volume.

dummy identifying when an agreement is in place indicates that trade relationships grow at a reduced rate due to the agreement. But this is a compositional effect whereby relationships already active when the agreement commences experience an increase in their rate of growth, while those which start after the agreement experience a larger (in absolute sense) decrease in their rate of growth. Including the length of the agreement indicates a large fixed effect for the existence of an agreement, and a very small negative effect for the length, indicating that as the agreement grows older the growth rate decreases at an increasing rate. An economic integration agreement reduces the initial volume with which relationships commence, with the effect small at the start of the agreement and becoming larger as the agreement itself grows older.

2 Theoretical Background

Our paper is directly related to a recent class of models that aims to better understand the dynamic pattern of foreign market entry by exporting firms. These models typically offer two innovations in terms of dealing with firm heterogeneity. First, it is posited that firms enter markets sequentially. After having acquired export experience in a single market, firms may subsequently expand activities to more destinations, while potentially never serving other markets. More generally, a firm's sales are imperfectly correlated across foreign destinations. In the Melitz (2003) model, in contrast, firms enter all profitable markets simultaneously. Second, unlike the Melitz (2003) model where the firm realizes its productivity prior to making any supply decisions, in these models a firm faces an uncertain foreign demand which can only be resolved by a firm exporting to a particular market. As a result, a firm may earn a negative profit forcing it to exit, resulting in an exporting failure. The canonical Melitz (2003) model cannot account for such an exporting failures, which have been shown to be exceedingly common in various data sets.

A central feature of models, such as Albornoz et al. (2012) and Nguyen (2012), in which producers gradually discover the success of their products in foreign markets, is that initial entry costs make it worthwhile to test export profitability in a single market. After the uncertainty is resolved, firms may give up exporting if they cannot profit, or they can start exporting to more destinations to test their success in previously unsupplied markets. Specifically, consider a firm that faces two types of costs associated with each destination it supplies: a fixed cost and a marginal cost. Fixed costs include the cost of maintaining a store front, advertising costs, as well as fixed shipping and port fees. Marginal costs include variable costs of both production as well as trade taking into account transportation and tariff related costs. Given that export profitability is unknown ex ante, it is beneficial for firms to learn about the appeal of their product in a first foreign market before sinking costs to export in more markets.

In this set-up, a firm can make one of two decisions vis--vis any specific destination. If it already exports to a destination, it must decide whether to remain in the market. Once a firm exports to a particular destination, its decision to continue exporting depends on, among others, the fixed and marginal cost: any decrease in either fixed or marginal costs will reduce the likelihood of an exit.

The second type of decision a firm makes vis--vis a destination is whether to begin exporting to test the market. The value of testing a particular market will depend on the likelihood of the firm staying in the market. As the likelihood of staying increases, the value of testing that market also increases. Since the likelihood of staying in the market is decreasing in fixed and marginal costs, any decrease in fixed and marginal costs will increase the value of testing a particular market.

For the formation of economic integration agreements, these models offer a number of testable predictions. As noted above, a fall in trade costs for selected markets has clear implications for the dynamic export behavior of firms. Firms already exporting

to a destination should benefit from trade liberalization. In addition, an agreement will also induce firms which previously did not export to that particular market to begin doing so as the value of testing the market increases given the reduction in the cost of market access. However, whether an entering firm will be successful and continue exporting will depend on its realized profit.

Empirically we should observe that firms, or products in our case, which are exported when the agreement takes effect, will receive a positive boost in the sense that they are less likely to exit and that the export volume increases, due to the reduction in costs. We should then find that for such products the hazard decreases in the wake of the agreement, while the growth rate of volume increases.

For products which are not exported when the agreement is signed the effects are largely an empirical question, though we could expect the effects to be reversed. The products which were not traded prior to the agreement were not traded due to an insufficiently high ex-ante profit. Alternatively, one could think of these products as not having a large enough perceived quality (or appeal) in the destination market. In other words, these may be marginal products which cannot be traded in the absence of an agreement. Their marginal nature implies that even though the reduction in costs increases the likelihood that they will be tested in a new destination, that the test itself fails. Their marginal nature implies that they may be tested with smaller shipments than was the case with products actively exported when the agreement takes effect. Even though the reduction in fixed and marginal costs in the wake of an agreement increases the likelihood that they will be exported, such efforts may largely be unsuccessful as the realized profit is not sufficiently high to allow for the continuation of exporting. We may expect such products to be characterized with higher hazard rates, lower growth rates of exported volume, and smaller initial (testing) volumes.

3 Data

We combine data from two sources. Trade flow data come from UN's Comtrade. We use the longest possible panel available with trade recorded annually from 1962 until 2011 using the 5–digit SITC revision 1 classification. As Comtrade provides data on both imports and exports, we chose to use data as reported by importers given their widely perceived greater accuracy. Since we use imports of all countries available through Comtrade, our analysis can be equivalently thought of as an analysis of imports or of exports. We shall, for the most part, simply use the term trade to avoid any confusion. For robustness purposes we also use Comtrade data recorded at the 6–digit HS classification reaching qualitatively similar results.

Data on economic integration agreements come from the Database on Economic Integration Agreements compiled by Scott Baier and Jeffrey Bergstrand (2007).[3] It collects data on various economic integration agreements as entered into by 195 countries on an annual basis between 1950 and 2005. Our sample observations are defined by the temporal intersection of our two sources, between 1962 and 2005. One advantage of using SITC revision 1 data dating back to 1962 is the relative paucity of economic integration agreements. Thus, for the vast majority of EIAs that have been observed since 1962 we observe their effect from the start of the EIA itself. This would not be the case if we used 6–digit HS, as we do in our robustness exercise, as HS data start in 1989. To illustrate, consider Figure 1 where we plot the fraction of bilateral pairs of countries which have an active EIA in every year between 1950 and 2005.[4] We refer to this fraction as the EIA utilization rate. In 1950 the utilization rate is less than a half a percent. In other words, less than a half a percent of pairs

[3] Available at `http://www.nd.edu/~jbergst`.

[4] This figure is similar to Figure 1 in Bergstrand, Egger, and Larch (2012) who investigate the determinants of the timing of preferential trade agreements using a duration framework. The two plots differ somewhat due to their inclusion of only PTAs, FTAs, and currency unions, and the fact that their plot is based only on agreements used in estimation. Our plot is based on all available data on agreements.

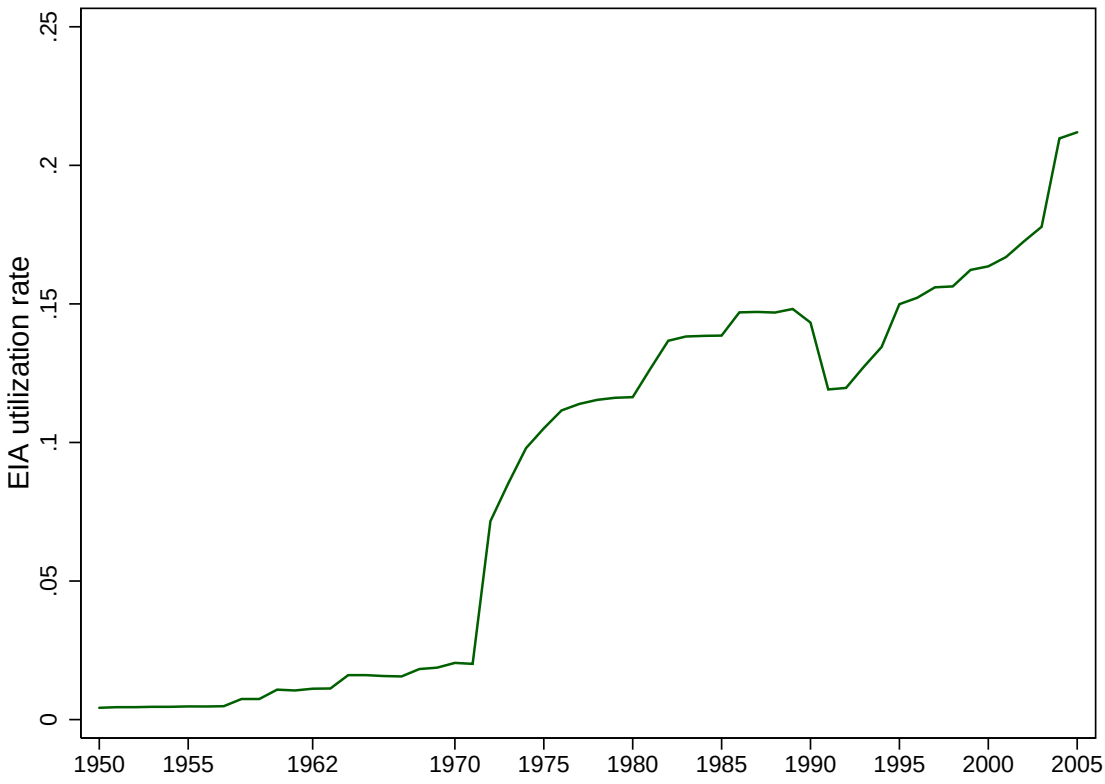

Figure 1: **Utilization of EIA over Time**

of countries that could have an EIA had an EIA in place. In 1962, when our sample begins the utilization rate increases to 1.1 percent. Thus, not taking into account the exact starting point of this small number of EIAs likely generates a small bias. By 1989, when the HS data become available, the utilization rate increases by an order of magnitude to 14.8 percent. The utilization rate reaches 21% by the end of our sample period.[5]

There are a total of 29,671,095 observations on trade flows between 1962 and 2005. Of these we have no information on economic integration agreements for 2,021,121 observations (about 7% of trade flow observations). In other words, these are bilateral observations on which the Database on Economic Integration Agreements is

[5]The drop in the utilization rate in the early 1990s (1991 through 1994 to be precise) likely stems for the break up of the eastern block countries in Europe, Czechoslovakia, Soviet Union, and Yugoslavia. By 1995 the utilization rate returns to its pre–breakup levels.

Type of agreement	Number of observations	Number of observations used in estimation
None	16,990,281	15,237,989
Non–Reciprocal Preferential Trade Agreement	2,468,555	2,389,726
Preferential Trade Agreement	1,459,940	1,418,321
Free Trade Agreement	3,736,467	3,274,454
Customs Union	1,404,939	907,092
Common Market	1,122,545	906,884
Economic Union	465,962	375,559
Total	27,649,671	24,510,480

Table 1: **Number of Observations by Agreement Type**

silent in the sense that there is no information provided.[6] Most often this pertains to instances of trade with very small economies, or countries which disappeared during the observed period as the database does not offer a historical perspective on agreements involving countries which no longer exists (such as the former Soviet Union, Yugoslavia, or Czechoslovakia).

Of the remaining 27,649,671 observations, some 61% involve pairs of countries which have no economic integration agreement in place at any point during the observed period of time. The remaining observations belong to the six types of agreements in the data: non–reciprocal preferential trade agreements (NR–PTA), (reciprocal) preferential trade agreements (PTA), free trade agreements (FTA), currency unions, common markets, and economic unions. FTAs are the most common type of an integration agreement accounting for 14% of observed disaggregated trade flows, followed by non–reciprocal PTAs with 9% and PTAs with 5% of observations. Currency unions account for roughly 5%, while common markets account for 4% and economic unions for 2%. For the purpose of understanding the effect of economic integration on the product–level patterns of trade, we do not distinguish between the different types of agreements, but rather focus on the sheer existence of an agreement of some sort. We made this choice in part due to complications stemming from

[6]One could interpret these as no agreement existing, but that would be incorrect as one would have to make sure no agreement in fact was in place.

countries upgrading or downgrading of shared agreements[7] and in part due to space constraints.

While we are primarily interested in the effects of economic integration agreements we include standard variables capturing country characteristics. We use the CEPII gravity data as the source for both the exporter's and the importer's GDP, distance, and existence of a common border and a common language.[8]

Since we examine the effect of economic integration agreements on trade relationships we define as a unit of observation a continuous spell of service involving two countries and a specific product. By this we mean consecutive years, beginning with the clearly observed starting point, during which a trade relationship is active. We differentiate between spells and relationships since a relationship denotes an exporter–importer–product triplet, while a spell indicates a period of time when that relationship is active. In the forty four years in our data set relationships may be characterized, and frequently are, by multiple spells of service. There are a total of 3,109,559 trade relationships in our data with 7,191,964 observed active spells, or 2.3 per relationship. Some 45% of all trade relationships have only one active spell, with 22% having two active spells, and less than 7% having six or more active spells. Table 2 shows that the vast majority of observed spells of trade are of very short duration, with slightly more than a half observed for just a single year and 90% observed for seven or fewer years.

The last column of Table 1 shows the number of observations on each type of an agreement in the dataset used in estimation. Our estimation sample is smaller by 3,139,494 observations, or some 10%, due to two factors. The majority of these observations, 2,843,686 to be precise, are left censored from the point of view of

[7]The former is far more common than the latter. As an example, Germany and Austria signed a free trade agreement in 1973, upgraded it to a common market in 1994, and again to an economic union in 1999. To properly investigate the effects of specific types of agreements, we would need to control for such changes dynamically. We felt this worthy task is better left for a future paper.

[8]Available at `http://www.cepii.fr/anglaisgraph/bdd/gravity.htm`.

Spell length	Number of spells	Fraction of spells
1	4,009,321	55.7%
2	1,109,540	15.4%
3	507,534	7.1%
4	294,258	4.1%
5	213,270	3.0%
6	174,633	2.4%
7	115,726	1.6%
8	99,488	1.4%
9	80,455	1.1%
10	80,313	1.1%
11-20	327,288	4.6%
21-30	82,061	1.1%
31-43	98,077	1.4%
Total	7,191,964	100.0%

Table 2: **Distribution of Spell Lengths**

conducting a duration analysis. They are observations on spells of trade which are active in the first year in which an importing country reports data. For all such spells the first year is not observed. For example, the first year in which the U.S. reports imports in our data set is 1962. All relationships involving the U.S. in 1962 are left censored. We omit all such observations from our analysis. The remaining observations, almost 300,000, have missing gravity data and are not used. We also examined specifications with Rauch product types and whether one or both countries belong to the GATT/WTO. These additional variables are missing for additional 3 million observations and since their inclusion generates no qualitative difference in results we chose not to use them. [9]

[9]The Rauch product types generate the well known results that differentiated goods face the smallest hazard, followed by referenced priced, and then homogeneous goods, as described by Besedeš and Prusa (2006b) and Nitsch (2009). Being a GATT/WTO member, either for an exporter or an importer, reduces the hazard of trade, with the effect larger for exporters. These results are available on request.

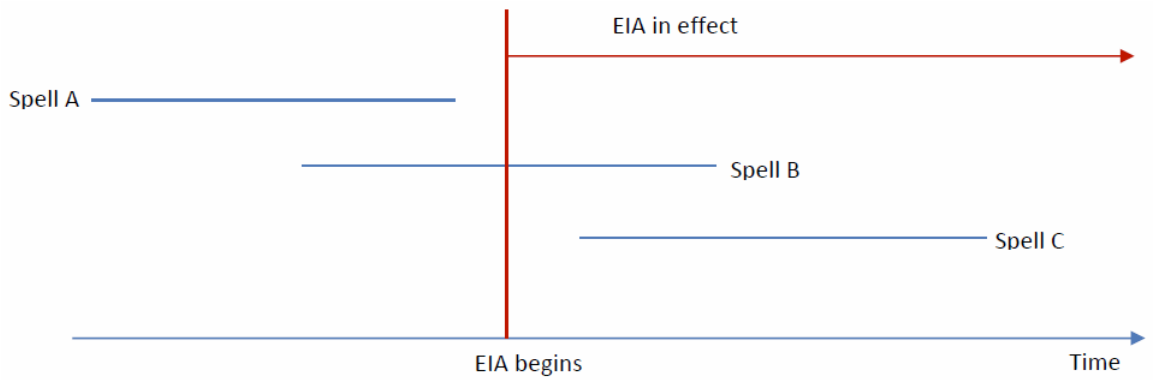

Figure 2: **Possible Effects of EIAs on Spells of Trade**

4 Methodology

We are interested in three attributes of trade spells: the volume of trade in the first year, the growth the volume while the spell is active, and the conditional probability it will cease to be active or the hazard rate. As the effect of economic integration agreements is perhaps most easily illustrated for the hazard of trade ceasing, we discuss those estimates more carefully and proceed more quickly when discussing the effect on the growth of trade and the initial volume. When thinking about the effect of EIA, as we will show, the timing of the agreement as it relates to spells of trade is of critical importance. To put it differently, it is important to differentiate spells relative to the starting point of an agreement and to identify whether spells are active when the agreement starts or whether spells start after the agreement is in place.

To fix ideas consider Figure 2. Here we layout a schematic look at the types of spells of trade a pair of countries can have as they relate to an economic integration agreement the countries enter into. The advent of an EIA allows us to distinguish between three types of spells. There will be spells such as spell A, which begin and end before the agreement goes into effect. These spells are unaffected by the agreement. There are also spells such as spell B which start before the agreement, but do not end until after the agreement goes into effect. These spells will be directly affected by the agreement. Finally, there are also spells such as spell C which start after the

agreement is already in place.

The existence of spells such as B and C guide our choice of specifications. We examine three specifications which differ in how the effect of an EIA is captured. The first specification is the simplest one. It has two variables capturing the effect of economic integration agreements. One variable, 'EIA exists,' identifies all pairs of countries which have ever had an agreement. In other words, this variable takes on the value of one for a given country pair in every observed year even if they had an agreement over some subset of observed years. This variable allows us to examine whether spells such as A in the figure exhibit a different hazard than spells of trade among countries which never enter into an EIA. To some extent this variable can address endogeneity concerns where the length of spells may affect the likelihood that two countries enter into an EIA. The large number of observed trade spells between any two countries make it less likely that the length of any given spell of trade will affect that probability. Allowing for that possibility, as long as the estimated effect of the 'EIA exists' variable is small in magnitude should alleviate endogeneity concerns. Below we show that this indeed is the case across all our specifications.

The second dummy variable, 'EIA in effect,' identifies the years during which an agreement is in force, but does not allow us to distinguish the potentially different effect on spells such as B and C. The first variable identifies whether the hazard of trade between countries with an agreement differs from that between countries without an agreement, while the second variable identifies the differential effect of the agreement itself.

The second specification adds a third dummy variable, 'Spell starts after EIA,' which identifies all spells which started after the agreement is put in force. This variable identifies the differential effect on spells newly created after the agreement, such as spells C. In this specification, the 'EIA in effect' variable identifies the effect on spells such as B, those already active when the agreement starts. The 'EIA in effect'

and 'Spell starts after EIA' variables in conjunction identify the effect on spells which begin after the agreement is in effect.

The third, and preferred specification, adds a fourth variable which measures how long, in logarithms, an agreement has been in place. This variable identifies whether the effect of an agreement at a micro level depends on how long it has been in place, as has been shown to be the case in aggregate measures by Baier and Bergstrand (2007) and Baier, Bergstrand, and Feng (2011).

These three specification are used whenever we are able to take into account the entire history of each spell, namely when we examine the hazard of trade ceasing and the growth of trade while the spell is active. All three cannot be used when examining the effect of EIAs on the initial volume of trade as such an investigation does not include the entire history of a spell. Rather it only uses the first year of every spell. This leaves us only with two specifications to examine. One where we can use the 'EIA exists' and 'EIA in effect' variables, where the latter identifies the differential effect of EIAs on initial volumes, and another one where we can also include how long the agreement has been in place.

5 Results

Our analysis proceeds in several steps. We first examine the hazard of trade spells ceasing and then the growth of the volume of trade within each spell. We conclude this section by examining the effects on the initial volume of each spell. Within each of these characteristics we analyze the effect of an economic integration agreement without distinguishing among the different types of agreements.

5.1 Hazard of trade ceasing

We estimate the hazard of trade ceasing by using random effects probit, which allows us to take into account unobserved heterogeneity. The use of a probit necessitates that we specify how the hazard depends on the duration of a spell for which we use the logarithm of the current length of the spell at every point in time (measured in years). To evaluate whether a variable has a significant effect on the hazard we first calculate the predicted hazard at the mean of every variable and then calculate the predicted hazard while changing the value of the variable of interest. For example, to evaluate whether spells of trade between countries sharing a common border have a significantly different hazard, we would calculate and plot the estimated hazard with the common border dummy set to zero and then set to one, while keeping all other variables at their respective means. We plot both the estimated hazard along with the 99^{th} percentile confidence interval, which is plotted with dotted lines.[10] As long as the confidence intervals do not overlap, the effect of common border is deemed to be statistically significant.[11] In fact, in virtually every plot we examine below, we find that the differences are statistically significantly different. Such an approach to examining the effect of a covariate is necessary as the effect and the precision with which it is estimated depend on the standard errors of all estimated coefficients, all pairwise covariances, and the distributional specification of the probit model.

As explanatory variables we use the standard gravity variables common in duration analysis of trade: GDP of both the importer and exporter, distance, common border, and common language. We also use the initial volume of trade as its effect on the hazard has been shown to be quite strong. Of our main interest are variables

[10] We include confidence intervals for every plotted curve throughout the paper. The corresponding confidence interval is always represented with a dotted line and of the same color as the curve depicting the predicted hazard. In most instances the confidence interval is imperceptible given the high precision of our estimated coefficients and the large number of observations on which they are based.

[11] See Sueyoshi (1995) for a longer discussion of how to evaluate whether the effect of a variable is significant when using probit to estimate the hazard.

pertaining to economic integration agreements. We investigate three different specifications which illustrate that the effect of economic integration agreements depends in an important way on precisely capturing the years while the agreement is in force as well as whether a spell starts before of after the agreement. Spell number fixed effects are included and unobserved heterogeneity is accounted for by inclusion of relationship–specific random effects in every specification. We collect our results in Table 3.

	(1)	(2)	(3)
Duration (ln)	-0.514***	-0.500***	-0.502***
	(0.001)	(0.001)	(0.001)
Initial imports (ln)	-0.081***	-0.081***	-0.081***
	(0.000)	(0.000)	(0.000)
Importer GDP (ln)	-0.009***	-0.011***	-0.012***
	(0.000)	(0.000)	(0.000)
Exporter GDP (ln)	-0.080***	-0.079***	-0.079***
	(0.000)	(0.000)	(0.000)
Distance (ln)	0.105***	0.103***	0.101***
	(0.001)	(0.001)	(0.001)
Contiguity	-0.123***	-0.126***	-0.127***
	(0.002)	(0.002)	(0.002)
Common language	0.014***	0.010***	0.008***
	(0.001)	(0.001)	(0.001)
EIA exists	-0.103***	-0.120***	-0.134***
	(0.001)	(0.001)	(0.002)
EIA in effect	0.048***	-0.197***	-0.274***
	(0.001)	(0.002)	(0.003)
Spell starts after EIA		0.301***	0.294***
		(0.002)	(0.002)
Duration of EIA (ln)			0.008***
			(0.000)
Constant	0.978***	0.997***	1.108***
	(0.006)	(0.006)	(0.007)
Observations	24,510,480	24,510,480	24,510,480
Number of relationships	3,109,593	3,109,593	3,109,593
Log-Likelihood	-10,354,031	-10,344,108	-10,343,660
ρ	0.166***	0.164***	0.164***

Standard errors in parentheses with *, **, *** denoting significance at 10%, 5%, and 1%.

Table 3: **The Effect of EIA on the Hazard of Trade Ceasing**

Before examining the effects of economic integration agreements variables, we offer a brief discussion of estimated coefficients of other variables. As is common in studies of duration of trade, longer lasting spells face a smaller hazard, as do those which start with larger initial volumes. Larger economies face a lower hazard of trade ceasing, with the effect larger for exporters than importers. Distance increases the hazard, as does common language. Common border reduces the hazard of trade ceasing.

A quick glance at the economic integration agreements variables indicates that one needs to carefully specify the relevant variables when identifying the effects of such agreements. Country pairs which at some point have an economic integration agreement in place have a lower hazard of trade ceasing across the three specifications. The magnitude of the effect differs slightly as the inclusion of additional variables pertaining to economic integration agreements allows for a more precise estimation of this effect. Our simplest specification, in column (1), indicates that the onset of an agreement increases the hazard, with the coefficient roughly a half of that identifying the difference between pairs of countries with and without an agreement at some point. Thus, we have a first glance at the fact that economic integration actually makes for shorter trade relationships and higher hazard – essentially reducing the stability of trade at the product–level level.

Our second specification, which adds a variable identifying spells which start after the agreement is in effect, reveals that the effect of the onset of the agreement is a composite of two effects. For spells which are active *when* an agreement takes effect, the agreement actually increases stability by reducing the hazard of that spell ceasing. For spells active *after* an agreement takes effect, the agreement actually increases the hazard and reduces the stability. The effect on spells commencing after the agreement is about fifty percent larger than the effect on spells commencing before the agreement is in effect.

Our last and preferred specification adds a variable capturing how long the agree-

ment was in effect. It indicates that the longer has the agreement been in place, the larger is the increase in the hazard over time, though the coefficient is small in magnitude. The estimated coefficient for the existence of an agreement and it going into effect both increase in magnitude, with the latter becoming larger by almost fifty percent.

To better gauge the effects of these variables on the hazard and how it differs across the specifications, as well as to speak to their significance, we turn to a set of figures where we plot the estimated hazard evaluated at means of all variables and with different values set for agreement–relevant variables. When doing so we essentially compare different hazard profiles. Since our results indicate that taking into account the timing of when an agreement takes effect and when a spell starts is important we evaluate the effects of these variables under the following set of arbitrarily chosen characteristics. As our benchmark we will compare the hazard for pairs of countries with and without an agreement at some point. For the latter group, we will also examine the effect of the onset of an agreement. As just discussed (see Table 3), the onset of an agreement affects the hazard. We will examine, for illustrative purposes, the hazard profile for spells which are in their sixth year as the agreement comes in effect. Note that given the distribution of spell lengths (Table 2) a full 85% of spells do not make it into year six, our chosen year to illustrate the effects of EIA. This should not be particularly troubling as year six was chosen purely for illustrative purposes. Moving the onset of the EIA to an earlier year of the spell would not drastically affect our conclusions.

In our last specification, for spells active when the agreement goes into force there is an additional effect, partially offsetting, due to the length of the agreement being in effect. Finally, for spells which start after the agreement we will assume, when relevant (when using the third specification), that they start in the sixth year of the agreement being in effect. Given the small magnitude of the coefficient on the length

of an agreement, changing in which year of the spell an agreement starts or in which year of the agreement a spell starts, only has minimal effects on our plotted hazard profiles.

We note that when examining the effect of an EIA on either already active spells or spells which start after the EIA, we evaluate the effect for the remaining possible duration of a spell given our data. Thus, for those spell affected by an EIA in their sixth year, we examine the effect during the remaining 37 possible years, even though the vast majority of spells do not make it into year six, let alone year 40. For spells which begin after the EIA, we plot the estimated hazard for 43 years, even though we can observe only a handful of such spells. To summarize the effect of an EIA we average the differences between different hazard profiles over all available years. To summarize the effect of an EIA on already active spells we calculate the difference in the hazard of spells affected by an EIA and those unaffected over the years 6 through 43, average the difference and divide it by the average hazard over year 6 through 43 for unaffected spells.

We collect the plots in Figure 3 where the plots for the first specification are in the first row, for the second in the second row, and for the third in the third row. Plots are organized by columns as well, with the first column showing the difference in the hazard profile for pairs of countries with and without an agreement. The second column shows the effect on an active spell of an agreement starting in the spell's sixth year of activity. Finally, the third column shows the effect on spells which start once the agreement is in its sixth year of existence.

Looking across the three rows of plots in the first column we can see that pairs of countries with an agreement have a lower hazard of mutual trade ceasing than countries without an agreement. The difference between the two is always significant and of similar magnitude across the three specification. The size of the difference increases somewhat as one moves down across the rows. For example, the average

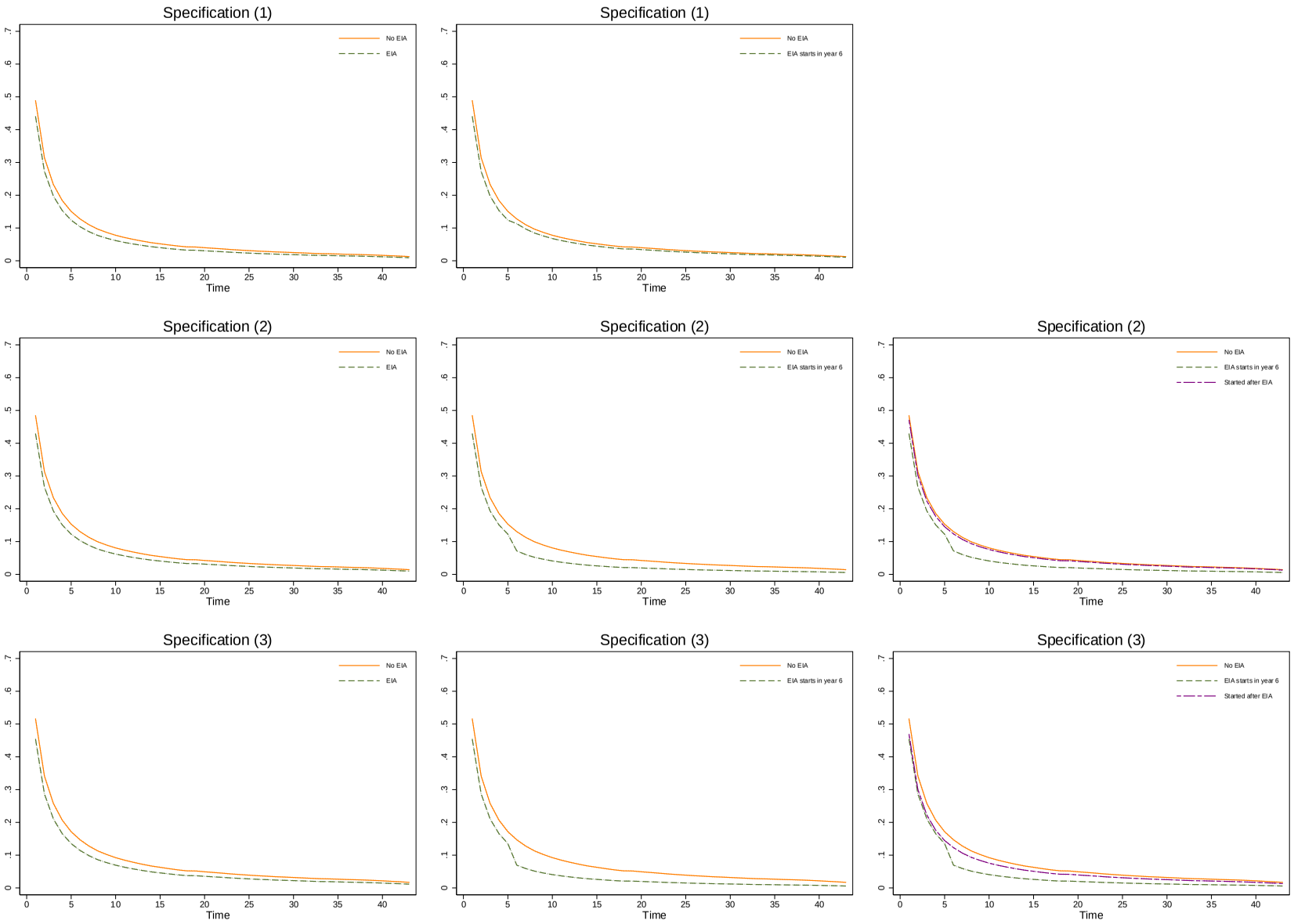

Figure 3: **The Simulated Effects of EIA Across the Three Specifications**

difference between the two hazards is one percentage point using the first specification and 1.5 percentage points using the third specification. A closer examination of the two hazards reveals that there are larger differences in the hazard in the first few years of a spell and virtually no differences in the last two years. Under specification (3) a pair of countries with an agreement faces a hazard that is 5.3 percentage points *lower* than does a pair of countries without an agreement. While that may appear to be a small nominal difference, it amounts to 10 percent of the hazard faced by countries without an agreement. Over the next four years of a spell (years 2–5) the difference averages 3.9 percentage point, and slowly decreases. Spells which are 25 years of length differ by less than one percentage point. However, such long spells account for less than two percent of all observed spells. While this effect appear to be small in an absolute sense, in a relative sense it is much larger. Relative to the average hazard over all 43 years faced by a spell of trade between countries without an agreement, a spell between countries with an agreement faces a hazard that is lower by almost 12%.

The second column illustrates the compositional effect of an agreement on already active spells. In the first specification, where we do not distinguish when a spell started relative to the agreement, the agreement is estimated to *increase* the hazard slightly when it starts in a spell's year six. The hazard increases in year six by just under one percentage point and averages less than a half of a percentage point over the remaining 37 years that a spell could be observed over. In the second and third specifications, where we allow for a different effect on spells beginning after the agreement, the agreement *reduces* the hazard. In year six, the first year the agreement is in force, the hazard reduces by 4.5 percentage points, or nearly 40% of the hazard that a spell for a pair of countries with an agreement would face at the same stage (31% if we compare it to a pair of countries without an agreement). This effect diminishes with duration, in part because the hazard itself decreases with duration.

Over the next three years, it is above 3 percentage points and falls to less than one percentage point by year 32 (there are only 1.2 percent of spells 32 years or longer).

While these effects appear to be small, in a relative sense the pack a significant punch. The reduction in the hazard for active spells due to an agreement taking effect in their sixth year averages 1.6 percentage point over the remaining 37 possible years. However, the average hazard for a pair of countries with an agreement at some point over the 43 possible years is 6.3 percent. Thus, the average effect of an agreement is a reduction in the hazard equal to a *quarter* of the average hazard. Relative to a pair of countries without an agreement the effect is equivalent to a reduction in the hazard by a fifth. The average effect relative to the comparable range of years for a spell (for years between 6 and 43, when the agreement has an effect) is an even larger 43%, almost a half of the hazard that a spell of trade between two countries with an agreement would face. Relative to a pair of countries without an agreement, the effect is equivalent to nearly a third of the observed average hazard.

The third column fully illustrates the compositional effect by adding a third hazard profile, that for spells starting once the agreement is in place. In both the second and third specifications, spells which start after the agreement have a higher hazard than those which start before the agreement. In the second specification the hazard for spells which start after the agreement is essentially the same as the hazard faced by spells of trade between countries without an agreement. In the third specification it is below the hazard for countries without an agreement, but higher than that faced by spells which were in place when the agreement went into force. Note that over the first five years of the spell there is not much difference between the hazard faced by spells started after the agreement and spells which were active when the agreement went into effect. The difference averages about one percentage point. But the agreement has a large effect on the latter spells, reducing their hazard by 5.3 percentage points in the first year of the agreement, a relative reduction of 45%. This effect averages

some two percentage points over the remaining 37 years, which is equivalent to an average relative effect of 53% reduction in the hazard.

To better understand the impact of each of the four EIA related variables used in the third specification, we offer Figure 4. In each panel we plot the estimated hazard with each of the four variables set to zero and one. Thus, the relevant comparison is to the hazard faced by spells of trade between countries that never share an agreement. This illustrates the pure effect over the entire possible length of a spell of each variable in turn in the absence of the other three variables. Clearly, some of these effects are impossible to observe in in some circumstances impossible,[12] but these plots allow us to clearly illustrate the effect of each variable and better understand how they combine to affect the hazard of trade ceasing.

The four plots in Figure 4 indicate that the smallest effect is exerted by the length of the agreement which increases the hazard. The effect is barely noticeable and averages just 0.2 percentage points or 3%. Countries which at some point enter into a mutual agreement face a lower hazard for their spells of trade, with the effect averaging 1.5 percentage points, or 20% lower hazard. The effect of the agreement going into effect is also to reduce the hazard, on average by 2.9 percentage points, or 37% lower hazard. Spells which start after an agreement face on average a 4.4 percentage point, or 56% higher hazard. Thus, while potentially appearing low, the effect related to economic integration agreements are economically large. Note that the full effect of an agreement on spells which start after the agreement is composed of the beneficial effect of the agreement itself and the negative effect of having started after the agreement, with the negative effect dominating, as discussed above.

Thus, we can conclude that an economic integration agreement has a dual effect on the hazard of trade ceasing. It reduce the hazard for spells already active, but increases it for any spell which starts subsequent to the agreement. To put it in

[12]For example, any spell already active when the agreement starts cannot be affected by the agreement in the spell's every year of duration.

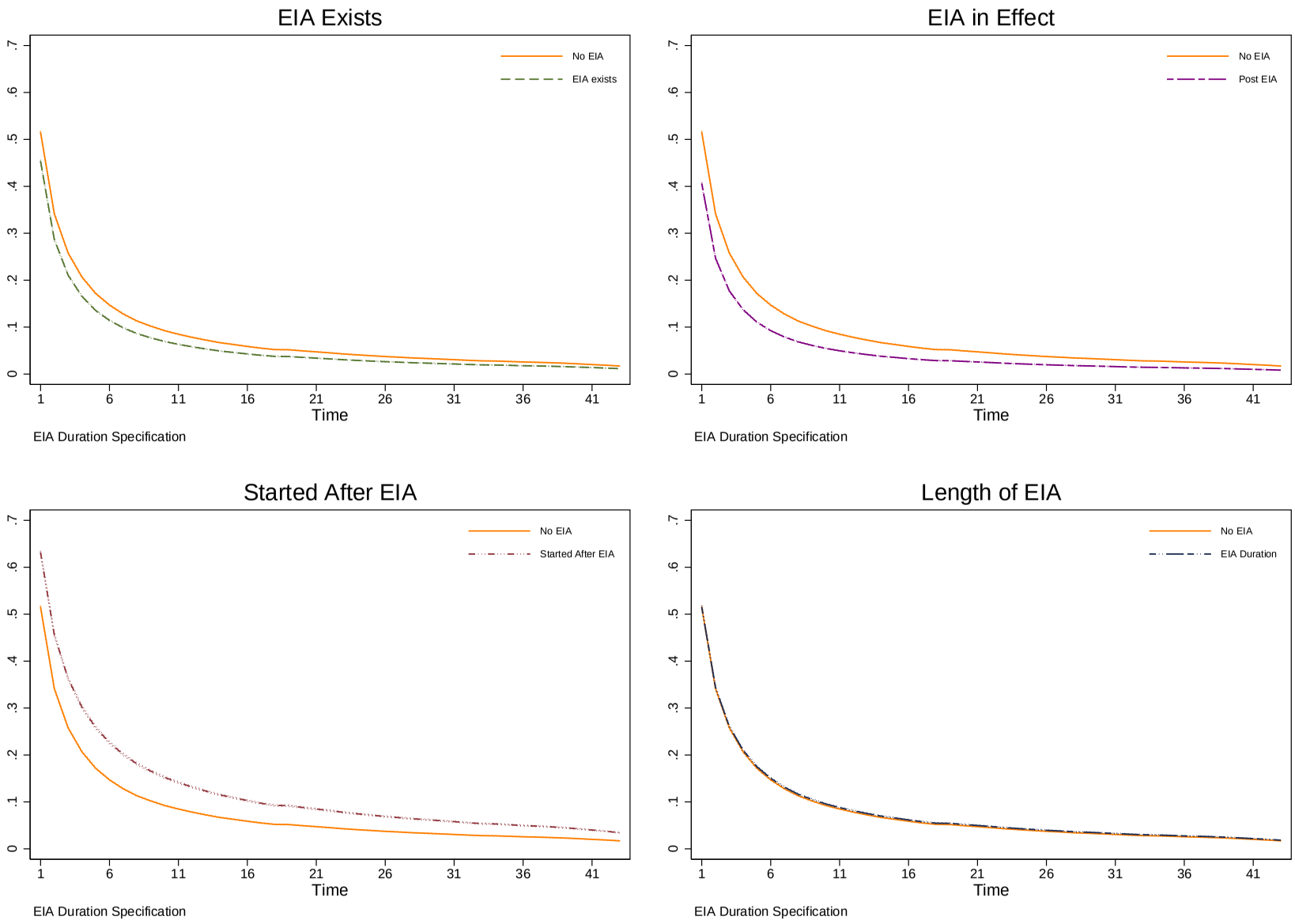

Figure 4: **Pure Effects of EIA Associated with Specification (3)**

different terms, economic integration seems to promote the stability of trade spells active when the agreement is signed and reduce the stability of those which commence in its wake.

5.2 Growth of trade

We now turn to examining the effect of economic integration agreements on the growth of trade embodied in active spells. Thus, we are examining the growth of trade conditional on spell survival. To put it differently, we are not concerned with explaining the negative growth that occurs with the complete decrease in the volume once the spell ends. As we are once again examining a characteristic pertaining to an active spell we can use the same set of explanatory variables as in our analysis of the hazard of trade ceasing. In our specification of the growth OLS regression we follow Besedeš, Kim, and Lugovskyy (2012). In addition to spell number fixed effects, each of the three specifications also includes calendar year, spell length, and 3–digit SITC level fixed effects.[13] Our results are collected in Table 4.

Similar to the results of Besedeš, Kim, and Lugovskyy (2012), we find that the rate of growth of trade within a spell decreases the longer the duration of the spell. Spells starting with larger volumes grow less, while the larger the exporter and the importer the larger the growth of trade within a spell. Distance reduces the rate of growth, while contiguity increases it as does common language.

The effect of economic integration agreements across the three specifications is similar to the effect on the hazard. Trade between country pairs with an agreement grows less, though the effect is small. Without distinguishing when a spell starts relative to the start of the agreement, agreements seem to reduce the growth rate. But this is a composite effect. For spells which started before the agreement, the

[13]The additional fixed effects are not used in the hazard analysis due to their computational infeasibility, both in terms of the length of computation and the fact that probit does not lend itself very well to a specification with many fixed effects.

	(1)	(2)	(3)
Duration (ln)	-0.267***	-0.269***	-0.268***
	(0.001)	(0.001)	(0.001)
Initial imports (ln)	-0.089***	-0.089***	-0.089***
	(0.000)	(0.000)	(0.000)
Importer GDP (ln)	0.024***	0.024***	0.024***
	(0.000)	(0.000)	(0.000)
Exporter GDP (ln)	0.015***	0.015***	0.015***
	(0.000)	(0.000)	(0.000)
Distance (ln)	-0.016***	-0.015***	-0.015***
	(0.000)	(0.000)	(0.000)
Contiguity	0.026***	0.027***	0.027***
	(0.001)	(0.001)	(0.001)
Common language	0.007***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)
EIA exists	-0.006***	-0.005***	-0.003***
	(0.001)	(0.001)	(0.001)
EIA in effect	-0.008***	0.017***	0.019***
	(0.001)	(0.001)	(0.001)
Spell starts after EIA		-0.036***	-0.033***
		(0.001)	(0.001)
Duration of EIA (ln)			-0.000***
			(0.000)
Constant	0.505***	0.505***	0.501***
	(0.010)	(0.010)	(0.010)
Observations	17,335,923	17,335,923	17,335,923
Relationships	1,840,903	1,840,903	1,840,903
R^2	0.027	0.027	0.027

Robust standard errors in parentheses with *, **, *** denoting significance at 10%, 5%, and 1%. Estimated using OLS.

Table 4: **The Effect of EIA on the Growth of Trade**

agreement generates a boost increasing the growth rate by 0.017 log points. Spells which start after the agreement have a lower growth rate with the effect twice that of the agreement being in effect, a decrease of 0.036 log points. The combined effect on those spells is then a reduction in the rate of growth. The longer the agreement, the lower the growth rate, though the effect is rather small.

Thus, we can conclude that economic integration agreements have a positive effect on the growth of spells already active when an agreement starts and a negative effect

on spells which started after the agreement.

5.3 Initial volume of trade

Our last investigation pertains to the the effect of economic integration agreements on the initial volume of trade. Since we are now examining a single value at the starting point of a spell our ability to identify different effects of economic integration agreements is reduced. A spell either starts before or after the agreement. As a result, the effect of an agreement taking effect is identical to the effect on spells starting after the agreement leaving us with two OLS specifications to examine. We use the same identifier of pairs of countries which have an agreement at some point, a dummy identifying the years when the agreement is in effect, and in our second specification a variable reflecting how long the agreement has been in effect when a spell starts. Our result are collected in Table 5.

Larger economies, both on the exporting and importing sides, have their spells starting with larger initial volumes. Distance reduces initial volumes, while contiguity and common language increase it. Countries which at some point have an economic integration agreement start their trade relationships at the product level with 0.075 to 0.121 log points larger initial volumes. This advantage is more than completely eliminated once an agreement is in effect, with initial volumes up to 0.374 log points smaller after the start of the agreement. Distinguishing between the fixed (with respect to time) effect of an agreement and the time–dependent one (length of an agreement) indicates a decrease in initial volumes sufficiently large to offset the higher volumes for pairs of countries with an agreement, and a cumulative negative effect as the duration of an agreement increases.

Thus, we conclude that economic integration agreements reduce the initial volume of trade.

	(1)	(2)
Importer GDP (ln)	0.163***	0.170***
	(0.000)	(0.000)
Exporter GDP (ln)	0.102***	0.103***
	(0.000)	(0.000)
Distance (ln)	-0.190***	-0.176***
	(0.001)	(0.001)
Contiguity	0.218***	0.233***
	(0.004)	(0.004)
Common language	0.030***	0.058***
	(0.002)	(0.002)
EIA exists	0.075***	0.121***
	(0.003)	(0.003)
EIA in effect	-0.374***	-0.168***
	(0.002)	(0.003)
Duration of EIA (ln)		-0.017***
		(0.000)
Constant	7.260***	7.023***
	(0.010)	(0.010)
Observations	7,174,557	7,174,557
R^2	0.035	0.038

Robust standard errors in parentheses with *, **, *** denoting significance at 10%, 5%, and 1%. Estimated using OLS.

Table 5: **The Effect of EIA on the Initial Volume of Trade**

6 Robustness

To examine to what extent our results are driven by our choice of the data, we use a different data set to examine the effect of EIAs. Rather than using the longest possible panel with trade recorded at the 5–digit SITC level, we now use the more disaggregated data recorded at the 6–digit HS level. We are trading off time, with HS data available starting in 1989 rather than 1962, but are gaining in the product level detail, going from 944 5–digit SITC categories to 5,038 6–digit HS categories. The result is a twice as large data set, recording 64,511,910 observations on trade flows, of which 2,516,761 belong to pairs of countries with no information on EIAs, and an estimating sample of 52,406,617 observations. Some 56% of these observations are for pairs of countries without an agreement, while 8% pertain to NR–PTAs, 5% to PTAs,

	1962-2005 SITC data			1989-2005 HS data		
	Hazard	Growth	Initial volume	Hazard	Growth	Initial volume
Duration (ln)	-0.501***	-0.268***		-0.443***	-0.341***	
	(0.001)	(0.001)		(0.001)	(0.001)	
Initial imports (ln)	-0.081***	-0.089***		-0.097***	-0.110***	
	(0.000)	(0.000)		(0.000)	(0.000)	
Importer GDP (ln)	-0.011***	0.024***	0.170***	-0.036***	0.038***	0.282***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Exporter GDP (ln)	-0.080***	0.015***	0.103***	-0.138***	0.012***	0.161***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Distance (ln)	0.099***	-0.015***	-0.176***	0.160***	-0.016***	-0.208***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Contiguity	-0.124***	0.027***	0.233***	-0.128***	0.049***	0.239***
	(0.002)	(0.001)	(0.004)	(0.001)	(0.001)	(0.002)
Common language	0.007***	0.008***	0.058***	-0.087***	-0.011***	0.101***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
EIA exists	-0.154***	-0.003***	0.121***	-0.047***	-0.005***	0.451***
	(0.002)	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)
EIA in effect	-0.276***	0.019***	-0.168***	-0.383***	0.004***	0.271***
	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)	(0.002)
Spell starts after EIA	0.299***	-0.033***		0.214***	-0.000	
	(0.002)	(0.001)		(0.002)	(0.000)	
Duration of EIA (ln)	0.008***	-0.000***	-0.017***	0.020***	-0.005***	-0.127***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Constant	1.139***	0.501***	7.023***	1.854***	0.816***	5.256***
	(0.007)	(0.010)	(0.010)	(0.005)	(0.008)	(0.007)
Observations	24,510,177	17,335,923	7,174,557	52,406,617	24,517,509	17,449,377
Number of relationships	3,109,559	1,840,903	3,109,559	11,831,067	5,037,710	11,831,067
R^2		0.027	0.038		0.032	0.089
ρ	0.164***			0.314***		

Robust standard errors in parentheses with *, **, *** denoting significance at 10%, 5%, and 1%. Hazard regression estimated with random effects probit, growth and initial value regression with OLS.

Table 6: **Comparison of SITC and HS Results**

17% to FTAs, 2% to customs unions, 8% to common markets, and 4% to economic unions.

We replicate all regressions using the HS data set, but in Table 6 report results only for our preferred specifications where we include the variable measuring how long the agreement has been in place. For ease of comparison we also report the corresponding results for SITC based data from earlier tables. Both sets of results are qualitatively similar, with the effects of EIA relevant variables having larger effects in the HS data set. This is also observed in Figure 5 where we plot the equivalent of Figure 3 using the HS data and results.

One difference between the SITC and HS results merits additional scrutiny. While the magnitude of all EIA related coefficients increases in the HS data set, the magnitude of the 'EIA exists' variable decreases by about a third. The likely explanation

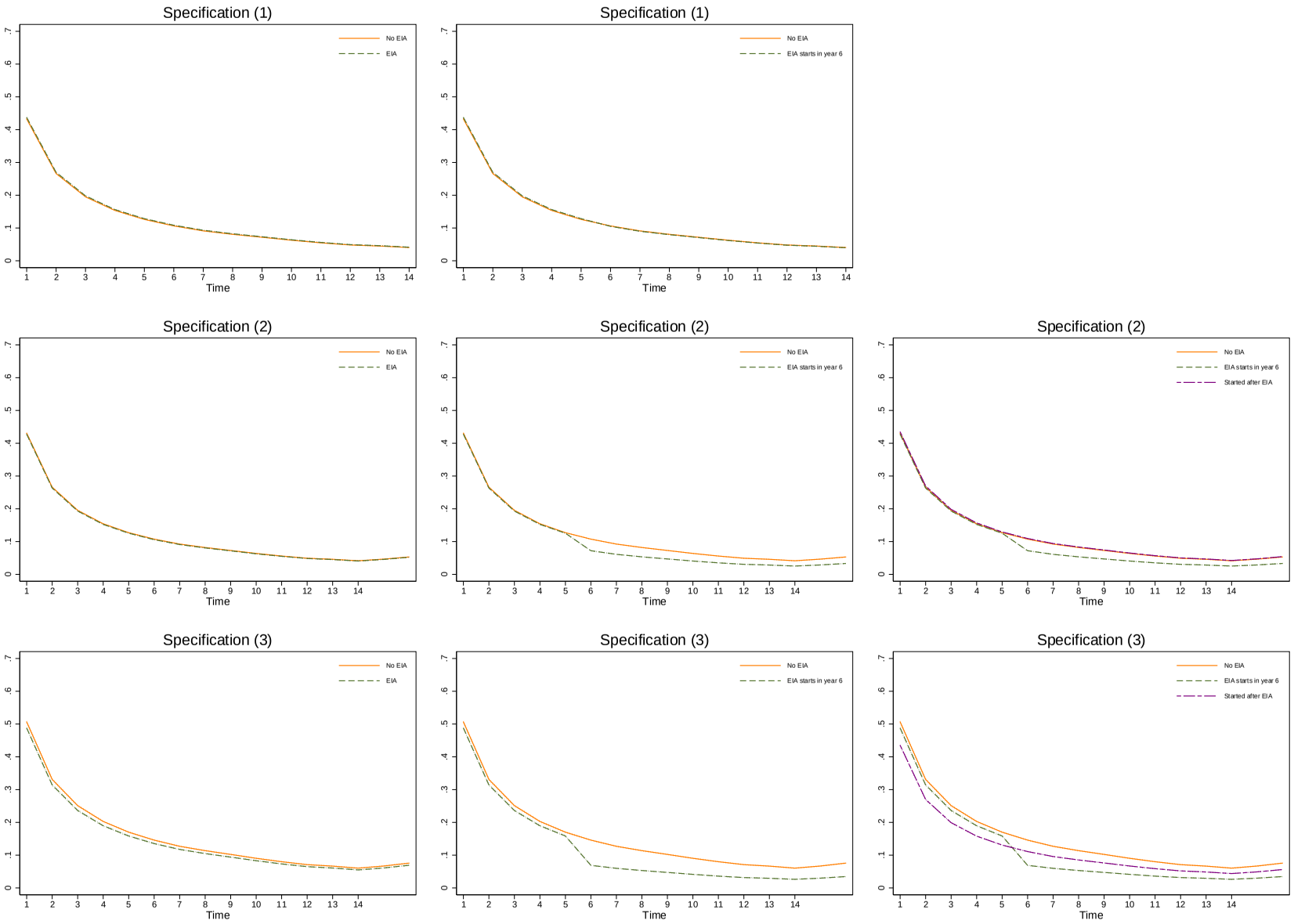

Figure 5: **The Simulated Effects of EIA for HS Data**

is the larger utilization of EIAs by 1989 when this data set starts (Figure1). Given the large number of EIA already in place in 1989 (especially those among developed economies such as the members of the then European Economic Community) the 'EIA exists' variable will identify a large number of spells among trading partners who have an EIA in place in every observed year. If EIAs increase the hazard for spells starting after EIA commence, it is likely that the effect of 'EIA exists,' which is negative (reducing the hazard) is muted as it is now associated with a much larger number of spells which have started after an EIA.

7 Conclusion

In this paper we offer the first evidence of economic integration agreements' effects on trade at the product level. We examine three attributes of trade embodied in trade relationships defined as importer–exporter–product triplets: the hazard of trade ceasing, the growth of trade within a spell, and initial volume. We find evidence of a dichotomy in the effect of economic integration agreements. On the one hand, they have a positive effect on the hazard and growth of already active spells – they are less likely to cease and grow faster after the agreement than they do before. On the other hand, economic integration agreements have a negative effect on the hazard, growth, and initial volumes of spells which start after an agreement – they are more likely to cease, grow less, and start with lower initial volumes. At the product level economic integration agreements reduce the stability of trade by reducing growth and increasing the turnover.

One is pressed then to reconcile the disaggregated evidence we presented with the aggregated evidence presented in Baier and Bergstrand (2007), that agreements increase trade albeit with a delay, and Baier, Bergstrand, and Feng (2011), that the effect of agreements eventually is stronger on the extensive than the intensive

margin. Our evidence is in line with that of Baier, Bergstrand, and Feng (2011). Once an agreement is in effect, the spells which are carried over, such as spell B in Figure 2, will eventually peter out, or at least become greatly outnumbered by the newly created spells (spell C in Figure 2). Spells which are carried over are positively affected by the agreement, so that they are less likely to cease and grow faster. Both of these effects boost the intensive margin, likely accounting for the Baier, Bergstrand, and Feng's (2011) finding that the intensive margin dominates in the short run after an EIA has been signed. We conjecture that the majority of spells carried over once the agreement is signed are spells of trade rooted in fundamental reasons why two countries commence trade, be it comparative advantage, returns to scale, or something else. The signing of an EIA makes such spells of trade even stronger as an EIA fundamentally reduces the cost of trading. Any spell which began in an era of higher costs will benefit from a reduction in costs of trading.

However, as an agreement continues to be in effect, the share of spells and trade positively affected by the agreement diminishes, as all spells eventually end or at least the vast majority do. Only 1.4% of more than 7 million spells we use in estimation are observed to last more than 31 years, and 0.3% last more than 43 years (see Table 2). As the spells such as spell B end, they are replaced by spells which started after the agreement, spells such as spell C in Figure 2. The newly created spells in the wake of an agreement start with lower initial volumes, grow less, and are more likely to cease. All three effects serve to diminish the role of the intensive margin. On balance, in the short run after an EIA goes into effect, the carried over spells dominate in numbers allowing the intensive margin to dominate. As the short run gives way to the medium and long run (ten years or more), the composition of the duration of spells active at that point is sufficiently altered in favor of the newly created spells, so that the majority of spells active at that point are the newly created ones. Given their poor performance on the intensive margin, the role of the extensive margin increases.

What must be taking place then is that the carried over spells (spells B) are replaced by new spells at a more than one–to–one ratio. One way for this to happen is that the two countries sharing an EIA expand the number of products they trade, which increases the extensive margin.

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