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The determinants of trade survival

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Keywords: Duration, Trade, Fixed Costs
JEL Classification: F1, C41

1. Introduction

Trade duration (and its determinants) has been most of the time overlooked in both theoretical and empirical literature. This is rather surprising considering that the length of trade relationships remains the main driver of the intensive margin, which is the most influential component of export growth (see *inter alia* Besedes and Prusa, 2007; Brenton and Newfarmer, 2007; Helpman et al., 2007; Felbermayr and Kohler, 2006; Evenett and Venables, 2002).[1] Our data show that the number of times trade is disrupted after a short period of time is considerably large. [2] On average 3 out of 5 new trade relationships fail within our period of investigation (i.e. 10 years), implying that improving survival rates is a key component of a country's export strategy. But why do trade relationships fail? What are the determinants of successful partnerships? These are the questions that this paper attempts to answer.

In a prominent theoretical contribution, Rauch and Watson (2003) explore the duration of trade relationships through a search model. The authors study the creation and evolution of partnerships between buyers (in developed countries) and suppliers (in less developed countries). The model proceeds in three stages: search, investment (deepening), and rematch (abandon current relationship and search for another supplier). A unique solution exists and three actions are possible for a buyer who has just been matched with a foreign supplier: immediate investment implying a large initial value of trade, a small initial value of trade to learn about the supplier before investing, or rejection of the supplier. The model predicts that the length of a trade relationship is positively correlated with the initial amount of the transaction, and that the propensity to start low value transactions increases with the cost of search and decreases with reliability. Besedes and Prusa (2006a, 2006b) as well as Besedes (2008) test some of the main predictions of the Rauch-Watson model using data on imports from the United States at the TS (Tariff scheduled) 7-digit level and at the HS 10-digit level. In Besedes and Prusa (2006a, 2006b) the authors find that duration of trade relationships face higher hazard rates for homogeneous goods than for differentiated products. Their results also suggest that short trading relationships tend to be low-valued. In a more recent study Besedes (2008) focuses on the persistency of short and small valued relationships by applying Rauch-Watson search model. In this framework, buyers, i.e. importers, start with small purchases because of the uncertainty surrounding the supplier. Orders increase only if the seller delivered and complied with his clients' expectations. However, another explanation for low export values at the beginning of the export activity could be related to the "traditional" product cycle: discovery, rapid growth, maturation and decline (Shepherd, 2007).[3]

In Besedes and Prusa (2007), the authors use non-parametric survival techniques (Kaplan Meier) to analyze the duration of exports to the US from 46 countries at the SITC 4-digit level between 1975 and 2003. They observe higher survival rates for developed and successful developing countries. These results are consistent with those found in Nitsch (2008), who analyzes the duration of German imports and its determinants at the 8-digit level from 1995 to 2005. In his analysis, the majority of

[1] Trade expansion can occur via two channels: the intensive and the extensive margin. Via the intensive margin countries increase exports of existing products with existing partners. Via the second channel countries expand their exports by introducing a new product in a new market, an existing product in a new market or a new product in an existing market.
[2] i.e. the number of times trade amounts to zero.
[3] In his study, Shepherd argues that most of the new products do not get into the maturation stage. Poor survival of low-valued trading relationships probably reflects the sensitivity to external supply or demand shocks.

trading relationships are of short duration and very often last only between one and three years. He also finds that duration depends on exporter and product characteristics, and on the size of the transaction.

All the authors cited above emphasize the role of the type of product and of trade values in determining the duration of trading relationships, but ignore the role of fixed costs. Yet, one possible explanation for trade stability (i.e. persistence of export status) goes back to the hysteresis trade literature of the 80's (Baldwin, 1986, Baldwin and Krugman, 1986 and Dixit, 1989). Inspired by the effects of the dollar overvaluation between 1980 and 1985, these models explain the persistence, i.e. hysteresis, of firms' export participation as a consequence of the sunk costs associated with the entry into new markets.[4] Following the dollar appreciation foreign firms entered the US market (while American firms exited some markets), but since they incurred entry costs they did not necessarily exit once the exchange rate went back to its initial value. Market entry is generally costly: firms have to meet market-specific standards and regulations, adapt their packaging, establish distribution channels, accumulate information about foreign markets, etc.

The key point in these models is that entry fixed costs can have an impact on firm's export status and therefore on trade duration. Based on these models, the empirical literature on export and firm performance has looked at the role of entry costs in the export decision process. In particular Tybout and James (1997) and Bernard and Jensen (1999, 2004) investigate the presence of sunk costs and its influence on firms' market participation. Both studies use lagged export status as a proxy for sunk costs and find that they play a significant role in the decision to export. Tybout and James (1997) employ a dynamic probit model to analyze the entry and exit decision patterns of a panel of Colombian manufacturing firms from 1981 and 1989. In their model, each firm has to pay a fixed cost before entering the export market. Following entry, firms only bear variable costs. They introduce dummies to control for the firm's past export status and show that exporting history matters. Bernard and Jensen (2004) use a linear probability framework to investigate the role and magnitude of sunk costs in a panel of U.S. manufacturing plants. They also find that the entry costs are significant and that the probability of being an exporter today increases by 36% the probability of being an exporter tomorrow. These papers identify the importance of entry fixed costs for export status, thereby providing evidence that they should also be included when explaining the duration of trading relationships.

Additional insights can be found in Irarrazabal and Opromolla (2009), who introduce uncertainty and sunk costs in a trade model with heterogeneous firms and where firm productivity evolve stochastically as a Brownian motion. The authors define a band of inaction like in Dixit (1989) and test using simulations how a cut in fixed costs and sunk costs could affect exporters and non-exporters' status. They find that a reduction in a per-period fixed costs increases persistence in export status for exporters but decreases persistence for non-exporters. The logic behind this result is that as fixed costs decline, the probability that an exporter would be able to cover his fixed costs

[4] In a more general framework, hysteresis can happen when the effect of any negative supply or demand shock persists even when the shock has vanished. Hysteresis models where demand factors play a role also predicts that new entrants initially facing low demand in foreign markets will not exit the market once the shock has vanished. In the next period, since consumers in the foreign market have tried their products, firms will now face higher demand curves. Consequently after the shocks vanished it is possible that not all the new entrants will be forced out. Essentially the shock leads to a lasting change in the information set of consumers and this structural change leads to hysteresis (Baldwin 1986).

increases. On the other hand a reduction in sunk costs decreases the persistence in export status of exporters and non-exporters. Finally, they compare the survival rates resulting from their simulations for both scenarios and observe that survival rates are larger when there are sunk costs. Similar studies presenting a dynamic version of the export decision and export path are Das, Roberts and Tybout (2007) and Eaton et al. (2008).

Following the empirical strategy adopted in Besedes and Prusa (2006b), we explore the patterns and determinants of trade duration for a set of 96 countries over the 1995-2004 period. To do this, we analyze the sequence of export status at the HS 6-digit level using the semi-parametric Cox survival model controlling for factors possibly influencing export survival. We do not only extend Besedes and Prusa's analysis to a matrix of bilateral trade relationships but we also augment the list of duration determinants using recent data on export costs. In particular, we take a closer look at the role of countries development level, the type of product, the size of exports and the role of export costs.

Our results indicate that trading relationships involving developed and emerging economies face lower hazard rates, i.e. lower risk of *"failure"*, than those involving developing countries. Second, our results suggest that the relationship between trade duration and the type of product portrays the degree of competition/information patterns characterizing traded products. Third, export size appears to be positively correlated with export survival. Finally, export fixed costs do affect trade duration, but their effect decreases with time and with exports size.
The rest of the paper is organized as follows. The next section describes the raw data and identifies geographic specificities of trade duration. Section 3 presents the empirical strategy adopted. Empirical results are summarized in Section 4. The last section concludes.

2. Duration, trade and development

2.1. Trade duration: a first mapping

In this section we look at the features of trading relationships among 96 developed and developing countries in order to sketch trade duration patterns across regions. The data presented here are also used to carry out the empirical analysis. Our data are extracted from BACI, a trade database maintained by CEPII.[5] Based on the United Nations' COMTRADE database, BACI provides harmonized bilateral trade data[6] at the HS 6-digit level for a total of 5,017 categories.[7] Its main advantage is that by applying different harmonization procedures (see Gaulier et al. 2007 for details), BACI reconciles mirror flows, thus providing a more complete and refined geographical coverage. Therefore, BACI achieves a greater accuracy of the zeros (i.e. absence of trade) in the trade matrix,

[5] BACI is the French acronym for Base pour l'Analyse du Commerce International: Database for International Trade Analysis. CEPII stands for Centre d'Etudes Prospectives et d'Informations Internationales.
[6] Different procedures have been developed to harmonise the data: the evaluation of the quality of country declarations to average mirror flows, the evaluation of CIF rates to reconcile import and export declarations, the conversion in tonnes of other units of quantities exchanged.
[7] In our analysis we can not distinguish the number of exporting firms since we use product level data. However, the absence of trade in one category allows inferring that no firm exports, and a positive trade value allows concluding that at least one firm exports the product. This implies that aggregation does smooth firms' entry-exit sequences but only partially.

which is of particular importance in the present case, as it directly enters in the definition of trade duration.

For the purpose of our analysis, we define three groups of countries: North (30 countries), Emerging South (21 countries) and Developing South (45 countries).[8] This broad categorization reflects only major differences in economic development but already permits a relevant characterization of trade duration. We define a trading relationship as the combination of an exporter, an importer and a product. Based on this definition, we identify 7’114’784 trading relationships[9] over the 1995-2004 period, 917’075 (ca. 20’000 per country) of which involve exporters from the Developing South (DS) group, 1’952’361 (ca. 93’000 per country) involve exporters from the Emerging South (ES) group and 4’245’348 (ca. 141’000 per country) involve exporters from the North (N) group.

We first look at the extensive margin for each group of countries. New trade relationships[10] represent 76% of total trade relationships recorded for the Developing South group. The figure is 63% and 47% for the Emerging South and North group respectively. We then qualify trade failure patterns, by counting the number of these trade relationships that disappeared during the period under consideration. Failure happens when a trading relationship disappears until the end of the period under consideration. The data show that 67% of the trade relationships initiated by the Developing South’s exporters failed within that period. In the case of the Emerging South 57% of the new trading relationships failed, while in the North group failure affected 62% of the new trading relationships.

Finally, we investigate the patterns and differences in trade duration, i.e. the length of a trade relationship, across regions. The duration can be simply assessed by counting the number of years, not necessarily consecutive, an exporter has served a market. Besides recording errors, the approach is unavoidably subject to right and especially left censoring due to the limited and relatively short period of time covered by the analysis. Despite these drawbacks, and leaving statistical methods used to correct for them[11] to the econometric analysis presented in section 4, we believe that a glance at data remains relevant to identify any specific patterns in trade duration possibly related to differences in economic development or any other characteristic. We sort trading relationships based on their durations and report the results in Figures 1a and 1b.

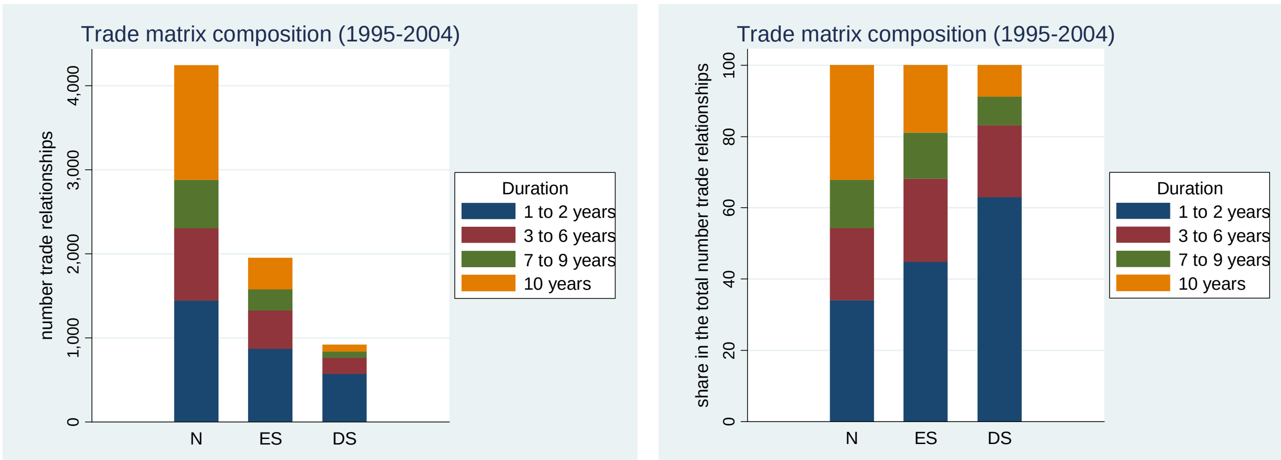
[8] Appendix 5 contains the complete list of countries included in the sample as well as their group affiliation.

[9] We excluded trading relationships with values below 1000 USD and trade relationships involving oil products. Potentially, more that 54 millions relationships could be observed for our sample at any period.

[10] A trade relationship is assumed to be "new" in our sample if it appeared in 1996 or latter. We also conducted the analysis including as new only those relationships appeared in 1997 or after. In the latter case results in relative terms are only marginally modified.

[11] Nevertheless, we reiterated the analysis counting as a single spell any multiple spell trade relationship. The impact on average trade duration remained very limited.

[Figures 1a and 1b: Trade matrix composition (1995-2004)]



These graphs do not include values below US$ 1,000.

First, we observe that the duration of trading relationships varies strongly across regions. Second, trading relationships are mostly of short duration. One and two-years old relationships account for at least one third of the total number of trading relationships in each region. The share is the largest in the case of the Developing South, with 63% of total trading relationships. On the other hand trading relationships with no interruption, i.e. with ten-year duration, account only for a small share in the trade matrix: 32% in the case of the North, 19% in the case of the Emerging South and 9% in the case of the Developing South group. The distribution of other durations i.e. durations longer than two years and shorter than 10 years, exhibits a remarkably similar pattern across regions as shown in Figure 1b. These figures show that although trade failure affects regions in a similar way; the time until failure varies strongly across regions.

2.2. Duration and trade values

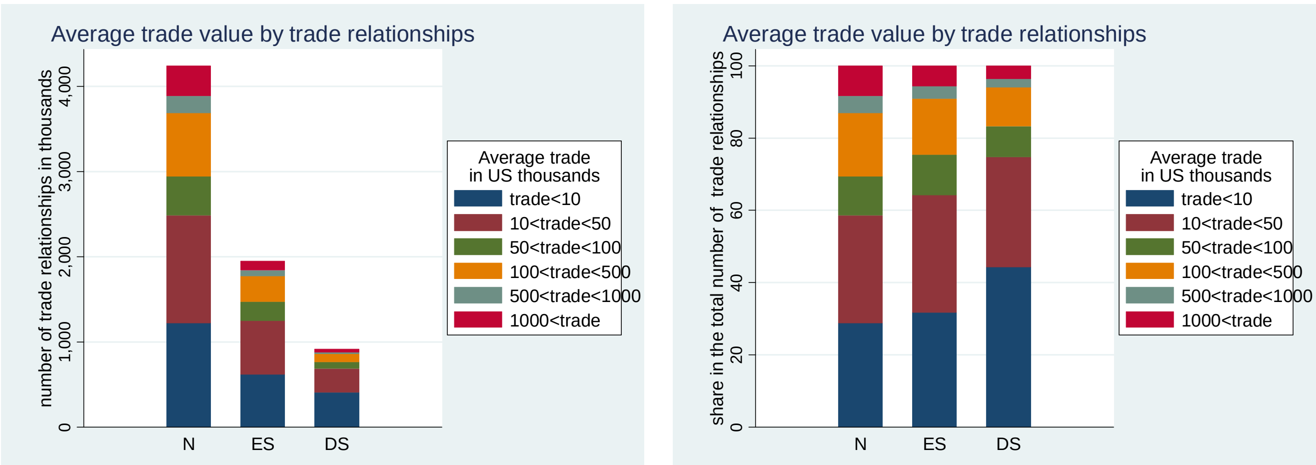
Another important feature of a trade relationship is its trade value, which is an ex-post indicator of exporters' profitability. In models dealing with export decision, exporters have to decide at the beginning of each period whether to enter a market -or keep serving a it- or not. Their decision depends upon the expected profits (see for instance Tybout et al., 1997, 2007; Hansen and Jensen, 2001). Although profits are rarely observable, by staying in the market i.e. positive trade value, a firm is signalling that it is at least covering its variable costs[12] and more important that the value of staying in the market exceeds the value of exiting it.[13] In order to sketch the distribution of trade values across regions, we first compute for each trade relationship its average trade value. The latter is the sum of the trade values in each year divided by the number of years of service. We then classify trade relationships according to their average trade value. Figures 2a and 2b show the results. The most striking fact is that between 55% (North) and 75% (Developing South) of the total number of trade relationships generate less than US$ 50'000 on average per year. Trade relationships with an average value between US$ 50'000 and US$ 500'000 per year account for

[12] Although this situation is only sustainable in the short run.

[13] In other words, the resulting negative profits are lower than what it would have to pay to re-enter the market later if it exits now.

around 30% in the North and Emerging South, and for 20% in the Developing South. Trade relationships with an average value of more than US$ 1 million per year are rare, representing less than ten percent in all three regions.

[Figures 2a and 2b: Average trade values (1995-2004)]



These graphs do not include values below US$ 1,000.

These figures show that the majority of the trade relationships are low-valued across regions. To get a sense of how average trade values vary with trade duration, we classify trade relationships according to their average trade and according to their duration. For accuracy purposes we exclude from our sample the one-year old trade relationships observed in 1995 (since we don't know if it started before) and in 2004 (for we don't know if they continue), as well as the ones concerning transportation equipment goods which are often a one-year-only transaction involving high trade values.[14] Results for each region are plotted in Appendix 1. Across regions more than half of the trade relationships that last for only one year have an average trade value lower or equal to US$ 10'000 per year. This is also the case for around half of trade relationships that last for 2 years. From 2 years on, the majority of trade relationships have an average trade value larger than US$ 10'000. In other words as duration increases, the share of low-valued trade relationships (less than US$ 10'000) decrease i.e. blue zone shrinks. At the other end most of the relationships that lasted for 9 to 10 years have an average trade value that is larger than US$ 50'000 per year.

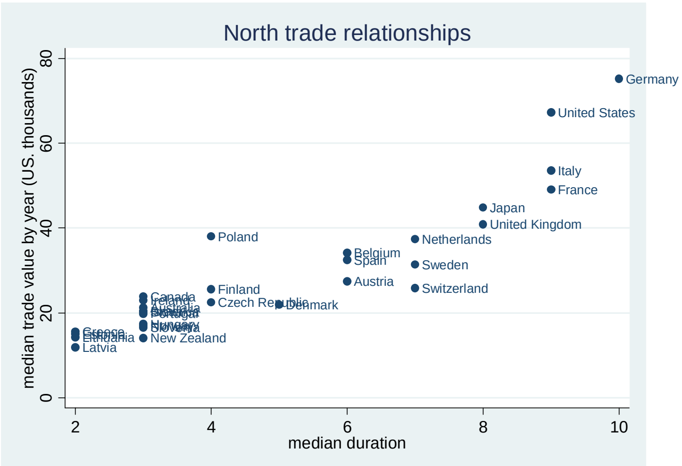
2.3. Duration, trade and development

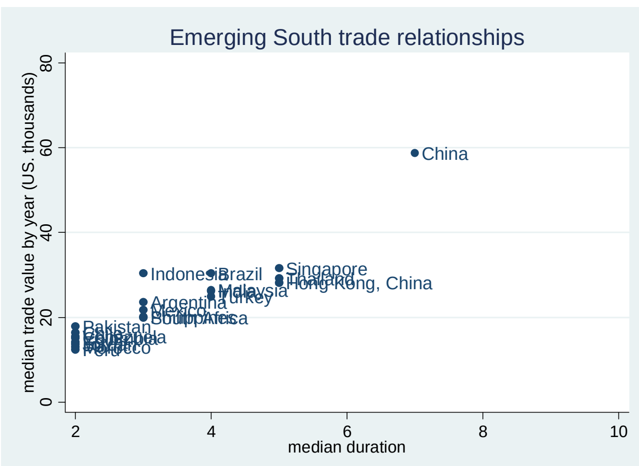
So far we have characterized each trade relationship by its duration and average trade value. In this subsection we take a closer look and examine how these characteristics evolve across regions. For each country, we compute the median duration and the median average trade value. The results are plotted in Figures 3a, 3b and 3c. For countries in the North and in the Developing South, we find a positive relationship between the median duration and the median average trade value. Countries like Germany, the United States, Italy and France show the highest export performance in the Northern

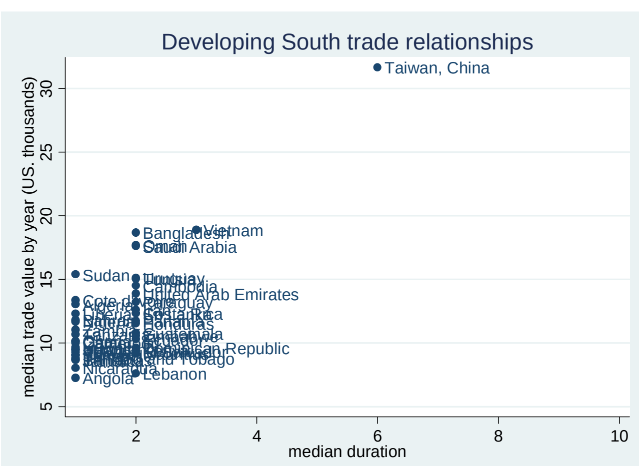
[14] These correspond to HS 2-digit codes: 86 to 89.

region in terms of duration. Eastern European economies and Greece show the lowest median duration and median average trade values.

[Figures 3a, 3b and 3c: Duration and trade values by countries]







As for the Emerging South, China is heading the group with the highest median duration (7 years) and average trade per year (US$ 59’000). Contrary to the North and the Emerging South, none of the countries in the Developing South show a median duration longer than 3 years and a median average trade value larger than US$ 20’000 except for Taiwan (6 years and US$ 32’000). The Developing South is also the only region to comprise countries with a median duration of 1 year. Indeed, the majority of countries in the Developing South are in the bottom-left part of the graph. Interestingly, these figures point to different stages of development and export performance across countries (in terms of duration and trade values). Moreover, average trade values associated with a given duration are consistent across regions. For instance, a 2-year median duration in the North includes countries with median trade values between US$ 10’000 and US$ 15’000. In the case of the Emerging South, the median trade values of a median duration of 2 years range from US$ 13’000 to US$ 19’000. Trade relationships in the Developing South with a median duration of 2 years have a median average trade value that ranges from US$ 8’000 to US$ 19’000. The consistency of these numbers across regions reveals a possible trade threshold. Among the 96 countries, trade relationships with a median average trade value larger than US$ 18’000 will last for at least 3 years in most of the cases. Countries whose median average trade value is between US$ 20’000 and US$ 40’000 per year will tend to export for 4 to 7 years. Countries with a median trade value larger than US$ 40’000 per year will tend to export more for more than 8 years.

The only exception being China, whose median average trade value is almost US$ 60’000 and median duration, is 7 years. These figures show that the patterns of trade duration portray countries’ level of development.

Descriptive statistics for the data reveal a series of stylized facts that could help qualifying trade duration across groups of countries: a) more advanced countries are involved in a larger number of trade relationships than less advanced countries; b) the extensive margin of trade is more prominent in trade relationships for less advanced countries; c) failure rates are not dramatically different across groups of countries and are even larger on average for more advanced countries; d) very short duration characterize trade relationships in less advanced countries; e) across regions the majority of trade relationships have an average trade value lower than US$ 50’000 f) trade relationships with low average trade values (less than US$ 10’000) tend to have shorter durations and g) trade duration portrays countries’ level of development.

The next section sketches the empirical model implemented in order to identify the main determinants of trade duration echoing these stylized facts.

3. Empirical analysis

In this section, we start by presenting the empirical strategy and the dataset used in our analysis. We then estimate trade relationships hazard ratios using the Cox model and discuss our main findings in section 4.

3.1. Empirical strategy

As previously mentioned, the length of trade relationships can be examined using survival analysis techniques. Hazard rate and hazard ratios are at the heart of this type of analysis. The hazard rate $h(t)$ is the ratio of the probability of failure to the probability of survival.

$$h(t) = \frac{f(t)}{S(t)}$$

In the continuous time case it can be interpreted as the risk of an event to happen (i.e. instantaneous rate of occurrence) by t, while in the discrete time case it is simply seen as the conditional probability that the event will occur in time t, given that it has not occurred before. We are interested in understanding how certain factors may affect the survival time of trading relationships. There is a large family of survival models that can be used for continuous or discrete time cases. We use the semi-parametric Cox (1972) model. This type of model has the advantage that it does not require the specification of the distribution of the duration dependency and it is therefore appropriate to assess the impact of explanatory variables on the hazard rate. The hazard rate in the Cox model is given by:

$$h_i(t) = h_0(t)e^{\beta' x_i}$$

where $h_0(t)$ is the baseline hazard function[15], which in the Cox model is assumed to be unknown and left unparametrized, x_i is a vector of covariates representing the characteristics of individual i, β is a vector of coefficients, accounting for the effect that those characteristics. The Cox model is a proportional hazard rate model, which means that the ratio of two hazard rates is a fixed proportion across time:

$$\frac{h_i(t)}{h_0(t)} = e^{\beta' x_i}$$

This implies that a covariate has an identical effect in every time period. Taking the natural logarithm, we obtain the additive log-linear model to be estimated:

$$\log\left(\frac{h_i(t)}{h_0(t)}\right) = \beta' x_i \quad (1)$$

In our analysis, we relax this hypothesis by including time-dependent covariates and time interaction terms: leading to an extended version of the Cox model. The estimates of the covariates parameters in Cox models are obtained by the estimation of the partial likelihood.[16] In our case since the data shows ties i.e. proper to non-continuous cases, the partial likelihood can only be approximated.

3.2. Data

A number of caveats in our dataset need to be highlighted. First and as already mentioned observations are likely to be subject to left and/or right censoring. In the case of left censoring we don't know if trading relationships with a positive value in 1995 began that year or any year before. For accuracy purposes we exclude possibly left censored relationships and keep only the ones that were established strictly after 1995. This reduces our sample by 24% in the case of the Developing South (i.e. 696'488 trading relationships remain), 37% in the case of the Emerging South (i.e. 1'233'476 trading relationships remain) and by 53% in the case of the North (i.e. 2'003'678 trading relationships remain). As for right censoring, it involves trading relationships observed in 2004, for which we don't know if 2004 was the exit year. Unlike left censoring, right censoring can be easily handled by survival methods.

Second, there is the issue of multiple spells (see Appendix 2): a trading relationship can stop and be re-established once or several times over our 10-year period, after an interruption of one or more years.[17] In our dataset 13% (in the case of the Developing South) to 20% (in the case of the North) of the trading relationships show multiple spells.[18] In this exercise, we look at the duration of first spells only, while controlling for the existence of multiple spells.

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[15] The term $h_0(t)$ represents the risk at time t when $x_i(t) = 0$.

[16] The partial-likelihood approach is used to estimate β without specifying the form of the baseline hazard function $h_0(t)$.

[17] In other words, a multiple spell is composed by more than one spell, each of them separated by one or several years of non-service i.e. no trade.

[18] These figures refer to the situation after we corrected for the possibility of measurement errors.

Finally, trade data can suffer from measurement errors. This is particularly important in the case of multiple spells. However if the interval between spells is just one year, the probability that this is due to misreporting is very high i.e. no trade recorded when in reality there was trade. Overlooking this issue could lead to the underestimation of the duration of the first spell. In order to correct for this possibility we assume that a one–year gap is a measurement error and thus merge into one all the spells with a one-year gap.

3.3. Control variables

Our main interest is to identify the factors that could explain the duration of trading relationships across regions. In order to do so we estimate equation (1), where the dependent variable is the hazard of a trade relationship, i.e. the rate of occurrence of a trading relationship exiting a market after *t* years, and where the explanatory vector of variables is composed of "gravity", product type, trade costs and other control variables. Sources and details for each variable used are provided in Appendix 3.

Gravity covariates

Variables used in standard gravity specifications retained for our analysis are: GDP per capita (in log), distance (in log), landlocked, border, common language and colonial links. The rationale is that these variables not only affect trade volumes, but also the occurrence of trade and thus its duration. As argued in Rauch (1999), proximity, common language and colony ties facilitate the establishment and increase the probability that a trade relationships succeed. As for the GDP per capita, it is a proxy for countries level of development as well as for the potential for sales. The GDP per capita is an average over the period of service and is included in its log form for both exporting and importing countries.

Products characteristics

We include dummies by type of product. We follow the classification used by Rauch (1999) in which products are classified according to their degree of differentiation: commodities or reference priced goods, homogeneous products and differentiated products. The first category of goods refers to goods that are traded on organized exchange markets and that involve specialized traders that centralize prices. Homogeneous goods are goods that are not traded in organized exchange but have a reference price (for instance quoted in trade publications). Finally heterogeneous goods are "branded" goods. We expect that trade relationships based on differentiated goods will exhibit longer duration as they face lower competition.

Fixed costs

To control for the fixed costs that exporters face, we use data from the Doing Business (DB) project, namely the time required to export.[19] This variable refers to the time (in days) necessary to comply

[19] Time is recorded in days. The time calculation for a procedure starts from the moment it is initiated and runs until it is completed. The procedures include preparation of bank documents, customs declaration and clearance documents, port filing documents, import/export licenses and other official documents exchanged between the concerned parties. Logistic procedures are also included; these range from packing the goods at the factory to their departure from the port of exit,

with all procedures required to export.[20] In our analysis, we prefer this time variable to the number of documents required to export (also provided by the DB database), which we consider less accurate: countries with the same number of procedures can require a different amount of time to complete them (Appendix 4[21]). We also consider the time required to import as a proxy for import costs and the time to start a business as a control for the business environment. The Doing Business project provides data for all the 96 countries in our sample but only from 2004 onwards in the case of the "Starting a Business" variables and from 2006 onwards in the case of the "Trade across Borders" variables. To deal with the lack of data between 1995 and 2003, we construct a set of dummies. For each cost variable we first compute the median cost across the whole sample. The associated dummy takes the value of 1 if the cost value is higher than the median time to export (which is 20 days) and 0 otherwise. In doing so we assume that countries that were in the upper half (lower half) of the cost distribution between 2004 and 2008, were also in the upper half (lower half) of the cost distribution between 1995 and 2004. This assumption is based on the observation that variation of costs over the period 2004-2008 is relatively low. Therefore the probability of a country switching from one half to the other over the 1995-2004 period will also be low. At the same time a change in the ranking *within* one half does not affect the value of the dummy and thus of the results. We construct three cost related variables in the same way: one for the export costs, one for the import costs and finally one for the costs related to starting a business.

Other control variables

Following figures in Appendix 2 and figures 4 (a, b and c) higher average trade values are expected to be associated with lower hazard rates, i.e. large average trade values diminish the risk of exiting the market. We therefore control for this by taking the average[22] trade value of the relationship over the period of positive trade activity.[23] The rationale is that the poor survival of low-valued trade relationships reflects their high sensitivity to any type of supply or demand shocks. We also control for the size of the importing market by including the average number of countries that export the same product to this market. The average is computed over the years for which the relationship existed. In addition, we control for the impact of trade policy by introducing the change in the exchange rate. Finally, we include the coefficient of variation of the tariffs faced by the exporter, as a proxy for the volatility of trade policy.

4. Results

We first estimate the model in equation (1) for the whole sample of countries. Results are reported in Table 1. We then estimate the survival equation for group of countries separately: Developing South,

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like for instance the time to load a cargo. This implies that this variable, although it refers to fixed costs, its impact on business could decrease across time as a result of learning effects.

[20] Other authors have also identified time as a trade barrier, although they have only focus on the time associated to transport (Hummels, 2001; Djankov S., Freund C. and Pham C. S., 2006).

[21] Figures in Appendix 4 show first that there is positive relationship between time and the number of documents required. Secondly, they show that the variability across countries is the largest for the time variable.

[22] We prefer this approach to taking the initial trade value as in Besedes (2008).

[23] An empirical issue in this case could be the presence of endogeneity because of the inclusion of the average GDP per capita and the average of the trade value. However the correlation between both variables is extremely low, 0.012, thus implying that the impact on the results is minor.

Emerging South and the North (Tables 2a, 2b and 2c). As a last step, we estimate the model for all countries but considering only manufactured goods (Table 3). In each case we run different specifications. The first one is the baseline model which excludes trade fixed costs. The latter are introduced in the second specification. A third specification is an augmented version of the previous one: we interact the average trade value with each costs variable. In all specifications, we control for multiple spells by adding a dummy that is 1 whenever a relationship has more than one spell. By doing so, we want to control for the possibility that the first spell in a multiple-spell relationship is systematically shorter than single-spell relationships. If that was the case and uncontrolled for that could bias the results.[24] We will mainly refer along this section, unless mentioned otherwise, to the third specification (see Column 3), for which the results are more conservative. Our analysis will focus on the effects of: 1) the exporter level of development (proxied by GDP per capita), 2) the size of the exports 3) the type of product and 4) the export fixed costs. Group dummies are introduced in the second and third specifications when estimated for the whole sample. The interaction terms show how the effect of fixed export costs evolves with trade and with time

4.1.1. Whole Sample

Countries with larger GDP per capita face lower hazard rates. Our results suggests that a 10 times increase in the GDP/capita of the exporting country reduces the hazard by 22% (i.e. $0.90^{\log(10)}$ -1 =0.78-1).[25] This result is consistent with the figures shown in the first part of this study, in which trade relationships from the North and in the Emerging South tend to have longer duration than the ones from the Developing South. Similarly, if the GDP per capita of a partner increases by ten times, the risk of stopping the relationship would diminish by 7% (i.e. $0.97^{\log(10)}$-1 =0.93-1). The relationship between trade values and duration observed in section 2 is also confirmed by our empirical results: relationships with higher average trade values face lower hazards. A 10 times increase in trade flows would lead to a reduction of 35% in the hazard (i.e. $0.83^{\log(10)}$ -1 =0.65-1).

As for the type of products, we chose *reference priced goods* as the base category. Our results show that the hazard rate for differentiated goods is 7% lower than that of reference priced goods. In the case of homogeneous goods the hazard rate is 8% higher than the one for reference priced goods. These results go in line with those of Besedes and Prusa (2006b), although their magnitude differs.[26] Differentiated products survive the longest, followed by reference priced goods and then by homogeneous goods. These estimates suggest that trade duration increases as products become more differentiated. Indeed, poor duration could result from strong competition in international markets: exporters of homogeneous products like primary goods, are likely to face fiercer competition and therefore lower survival.

Estimated coefficients of the export fixed costs are to a large extent in line with existing theoretical and empirical evidence: fixed costs matter for the export participation decision and act as a deterrent to market exit. Other things equal, countries with higher export fixed costs, measured by the time

[24] First spells with only one year of service in a multiple-spell relationship accounted for 67.5% of the total number of trading relationships, and first spells with less than three years accounted for 92% of the total number of trading relationships.

[25] In 2004, the country in our sample with the lowest GDP/capita was Zimbabwe (with US$ 202 (PPP)) and the largest were Norway (with US$ 45'154 (PPP)) and Qatar (with US$ 68'166 (PPP))

[26] The authors find that the hazard for differentiated products is 18% lower than for the reference priced products and 25% lower than homogeneous goods.

required to export show lower hazard rates (2% lower). The introduction of an interaction term between a trade fixed costs and the average trade value aims to capture the effect of the fixed costs on the hazard when trade value varies. The coefficient of the interaction term suggests that a 10 times increase in the export flows would decrease the hazard by 5% (i.e. $0.98^{\log(10)*1}$ -1 =0.95-1) if exporters faced large fixed export costs. In other words, the effect of fixed costs on the length of trade relationships is stronger for high-valued trade relationships.

Trade relationships that are disrupted at least once and are re-established face a hazard rate that is about 98% higher than the hazard of single spells trade relationships. In other words, the first spell of a multiple spell trade relationships will be systematically shorter than single spells trade relationships.

The coefficient on the region dummies DS and ES are both statistically significant (with the North as the base region). According to the results, the hazard of trading relationships from the Developing South is 25% higher than the ones involving exporters from the North. In the case of Emerging South, trading relationships have a hazard rate 7% lower than the one involving exporters from the North. Compared to the North, trade relationships from the Developing South are shorter while the ones from the Emerging South last longer.

One remark concerns the validity of the proportionality assumption. Since the Cox model relies on the proportional hazards assumption, we carried out the Schoenfeld test[27] based on the regression residuals to assess the validity of this assumption. The overall result pointed to the rejection of the proportional assumption. This is common, especially when time-varying covariates are included in the model, which is the case in the present study (i.e. GDP, trade value, competition, exchange rate)[28]. To take into account of the time dependency of certain covariates vary with time, we took their average over the life period of a relationship, so that the variables GDP per capita, trade value, competition and exchange rate are spell-specific (i.e. period specific). However, it would also be reasonable to assume that fixed costs do not comply with the proportionality assumption, meaning that the effect of export fixed costs changes over time. Our measure of fixed costs includes, among other factors, the time spent on export procedures (i.e. on learning about bureaucratic procedures). So it is reasonable to think that once exporters have learnt how to proceed, the time required to export in the next period would be lower. This is equivalent to test for a proportional effect of the costs variable. Next subsection explores a fourth specification: we allow for non proportionality also on the export costs by adding an interaction term between the fixed costs and the time duration of a relationship (i.e. number of years, in logs). [29]

[27] Under the null hypothesis, the proportional hazard ratio is accepted.

[28] In this case, the usual procedure is to model time dependency by introducing an interaction effect between some function of time and the covariate that does not comply with the proportionality assumption. By doing so, we relax the assumption that the hazard ratios are proportional across time for the covariate in question.

[29] In the Cox model, the dependent variable is time until an event occur, this is why the variable "Time" is not included when it is interacted with other covariates in the model. If we include time as a covariate, we would be explaining time until event occurs with a time counter (Box-Steffensmeier et al., 2003).

4.1.2. Group specificities

In the second set of regressions, we estimate the survival equation separately for each region. The results are very similar to those in Table 1 (comments are based on column 4)[30], except for the coefficient of the fixed costs and the related interaction terms.

A 10 times increase in the GDP/capita for countries in the North group reduces the hazard by 71%, and by 13% in the case of Developing and Emerging South. This is not surprising given the structure of the sample. The effect of an increase in the GDP/capita on the duration of a trade relationship is stronger for higher levels of GDP (as is the case of the *North*).

In the case of the Developing South, the coefficients on the product types are now all below unity. The hazard of differentiated products exports is 7% lower than the one from *reference priced* goods, while the one of homogeneous products is 0.4% lower. However the effect is not statistically significant for the latter. In the case of the Emerging South, both coefficients are statistically significant. Differentiated goods have a hazard ratio 7% lower than the one for reference priced goods. On the other hand, homogeneous products show a hazard that is a 5% higher than the base category. These effects are also confirmed in the case of the North. Differentiated goods hazard rate is 5% lower than for reference priced products, while homogeneous goods have a hazard ratio that is 9% higher. The results show that the effects of the product type on duration are similar across regions.

As for the export fixed costs, their effects on the hazard differ from the results based on specification 3 for the whole sample. Once we have included the time interaction term, we find that countries facing high export costs will have a higher hazard than countries with lower export costs. The coefficient on the export costs is always above unity. However the interaction term is always below unity which implies that the effect of the fixed costs decreases with time. In the case of the Developing South, high export costs lead to a hazard rate that is 12% higher. The results suggest that high entry costs have initially a negative impact on the length of trade relationships. This is in line with Irarrazabal and Opromolla (2008) who find that the persistence in the export status of exporters' increases as fixed costs decreases. These effects are larger in the case of the North and the Emerging South, where high export costs increase the probability of exiting the market by 24% and 26% respectively. However, again this is only at the beginning since the effect diminishes with time. The results indicate that high export costs increase the hazard in all regions, but that the effect is less pronounced for the South region. Since, exporters in the Emerging South and in the North face on average lower fixed costs than exporters in the Developing South, this last result could suggest a partial "persistency" effect in the case of the Developing South. Second, the effect of the fixed costs on the hazard diminishes across time.

Additionally, an increase by 10 times in trade flows will lowers the hazard rate by around 41% in the case of the Emerging and the Developing South, and by 36% in the case of the North. As for the interaction between trade values and the time to export, the coefficient is larger than one for the three regions, suggesting that the combination of the two effects increases the hazard by 38%, 52% and

[30] We also try a specification with strata by type of product (HS 4-digit level). The results remain very similar and are not presented here.

61%[31] when trade flows are multiplied by 10 in the case of the North, the Emerging South and the Developing South respectively. This effect is surprising, and we prefer to take it with cautious. It implies that for countries where export costs are high a rise in trade flows will lead to an additional increase in the hazard. So the negative effect of the trade costs on trade duration becomes stronger as trade rises. This could reflect a crowding-out effect of the market. As exports increase, competition also increases, thus lowering the probability of survival; the effect becomes noticeable only when exporters face high export costs.

Trade relationships that are disrupted at least once and are re-established face a hazard rate that is between 60% (in the case of the Developing South) to 80% (in the case of the Emerging South) higher than single spells trade relationships.

Some final remarks: the average number of competitors decreases the hazard rate in all regressions; this could imply that as the market capacity increases, the risk of exiting a market decrease. The effect ranges from 1% to 3%. A depreciation of the exchange rate over the life period of the trading relationship also diminishes the risk of exiting the market by 15% in the case of the Emerging South and almost no impact in the case of the Developing South. The exchange rate is given in US dollars for each country, reason why the coefficient of this variable can not be properly interpreted when we only consider the North (which includes the U.S.). Common language, border and colonial link also diminish the hazard rate (Table 1) market, while landlockness and distance raise it. At the regional level, colonial link variable increases the hazard, except for the North. Overall, the results confirm the fact that sharing a border, a common language and colonial past facilitates the establishment of trade relationships and of deeper business links. On the other hand, trade survival/duration is more difficult for exporters from landlocked countries and for exporters trying to develop trade with distant partners; probably because in both situations variable costs are high.

As for the import costs, high import costs decrease the hazard rate. The latter could be seen as an indication of how difficult it is to import in a country and therefore how difficult it could be to establish or build a trade relationship with this country. So once the relationship is established, it is costly to re-establish it again. The results implies that in trade relationships where the import partner has high import costs, the probability of at least one firm (the most productive one) keeps exporting will increase. At the aggregate level, this implies that the hazard of a trade relationship with high import costs is lower than the one of a trade relationship with lower import costs.

4.1.3. ***Manufactures and Trade Protection***

In the third set of regressions, we include trade tariffs from the data base "Trade, Production and Protection" (Nicita & Olarreaga 2007) to control for the impact of trade policy on trade duration. Because of data availability, we had to restrict our sample to manufactured products. The results are exhibited in Table 3 and are very similar to those in Table 1.

The only difference is the inclusion of the coefficient of tariffs variation, by which we expect to catch the volatility of trade policy. The coefficient for this variable is statistically significant and below unity. We also apply the average tariff (results not shown) over the period instead of the coefficient of variation. No major difference is found, the coefficient remains below unity and

[31] $1.23^{\log(10)*1} - 1 = 0.61$; $1.20^{\log(10)*1} - 1 = 0.52$; $1.15^{\log(10)*1} - 1 = 0.38$.

statistically significant. As argued in Besedes and Prusa (2006b), higher tariffs (or higher tariff variation across countries) lower the hazard as it implies less competition for incumbent firms.

In the new sample, a 10 times increase in the exporter' GDP/capita diminishes the hazard by 24%, while an increase of the same amount in the importer's GDP cut the hazard by 8%. Additionally, if the average trade value of a trade relationships increases by 10 times, this will lower the hazard rate by 37%. This is almost the same value found in the complete sample, suggesting that the effect of the GDP variable on the duration of trade relationships holds regardless the type of product.

When considering only manufactures, differentiated products face a hazard that is 8% lower than the one for the base category. The opposite effect is found for homogeneous goods. Their hazard is 8% higher than the reference priced products.

The export fixed cost and its interaction term have a negative effect on the hazard ratio of trade relationships. In both cases the hazard rate is reduced by 2% in the presence of high fixed costs, when proportionality of the hazard is assumed.

4.1.4. Robustness and extensions

Here we use a three–level export cost covariate rather than a two-level cost covariate. In other words we define three dummies for the export costs variable instead of two: LowCost (*cat1*) equals 1 when the number of days to export ranges from 1 to 16 and zero otherwise, MiddleCost (*cat2*) equals 1 when the number of days to export ranges from 17 to 23 and zero otherwise, finally HighCost (*cat3*) equals 1 when the number of days to export is larger than 23 and zero otherwise. We do this to have a more accurate idea of the level of the fixed costs in each country and allow for greater flexibility in the model. Our based category is category 1. The results are shown individually for each region on tables 4a, 4b and 4c. The first regression is the baseline (the same than before), the second one includes the business, imports and exports costs variables. In the third one, we control for the interaction between the size of the transaction and the export costs. Finally, we add the time interaction term. We will mainly refer to the forth specification (column 4) and comment only on the modified covariates.

The covariates on the export costs covariate suggest that, the higher the export costs the stronger the effect on the hazard rate, and so the larger the negative effect on the survival of a trade relationship. This result applies to the North and the Emerging South, although the effect is weaker for the latter i.e. the effect of *cat2* and *cat3* are very similar. In the case of the Developing South, we find that if exporters face middle-level costs the hazard will be 16% higher than exporters facing low-level costs. On the other hand, if exporters face high-level costs the hazard will be only 5% higher than exporters facing low-level costs. These results suggest a persistency in the export status in the case of the Developing South when exports costs are high.

It is also worth noting that the effect of the export costs on the hazard for countries in the Emerging South group is higher than in previous specifications. Countries facing middle or high-level costs show a hazard rate that is around 81% higher than countries where export costs are low. The reason for this result lies on the fact that most of the countries in this group belong to the middle or high-level cost category, except for three countries Argentina, Hong Kong and Singapore.

As in previous specifications, the time interaction term indicates that the effect of fixed export costs diminishes over time and this is consistent across regions.

For the rest of covariates, we find similar a results that in previous specifications. For instance, trade relationships based on differentiated goods exhibit a hazard rate that is 5% (North) to 7% (Developing South) lower than the hazard of relationships based on reference priced products. The opposite is found for relationships based on homogeneous goods, the hazard is 7% to 9% higher than the hazard of relationships based on reference priced products, except on the case of the Developing South, were the hazard is almost equal to one and insignificant. The result remains consistent across regions and across the different specifications. Trade relationships with higher trade values last longer than short-value trade relationships.

We also run our specification using with the fixed costs per country i.e. number of days required to export, instead of dummies by group. The results remain unchanged.

5. Conclusions

Exporters' survival in foreign markets is essential to achieve sustained export growth. This paper shows that export survival strongly differs across regions and analyzes the impact of different covariates on the duration of trade relationships. We focus on countries' stage of development, the type of product, the size of exports and trade costs, while controlling for country and market characteristics. First, we find that the duration of trading relationships increases with the region level of development. In particular, trade relationships from the North face the lowest hazard rates, followed by the Emerging South and the Developing South. Moreover, our results by region suggest that the effect of an increase in the GDP/capita on trade duration is larger for higher levels of GDP. Secondly, our analysis shows that the duration of trade varies with the type of product, which is in line with previous studies (Rauch, 1999; Besedes & Prusa, 2006b). Our results further suggest that this effect is very similar across regions. Trade relationships involving differentiated goods show a probability of failure that is 11% to 13% lower than the one obtained for trade relationships involving homogeneous goods. As for trade costs, high export costs increase the hazard in all regions but by less in the North and the Emerging South. This is not surprising given that exporters in the Emerging South and in the North face on average lower fixed costs than exporters in the Developing South. However, the effect of fixed costs on hazard rates falls over time, suggesting the existence of learning effects (i.e. export experience matters).
Finally, our results also suggest that overall trade relationships with higher average trade values face lower hazard rates. A 10 times increase in the average trade value lowers the hazard by 36% to 41%. The effect is consistent across regions and points out the importance of market expansion.

Further investigation will explore to what extent poor survival prevents developing economies from diversifying into new products or new markets.

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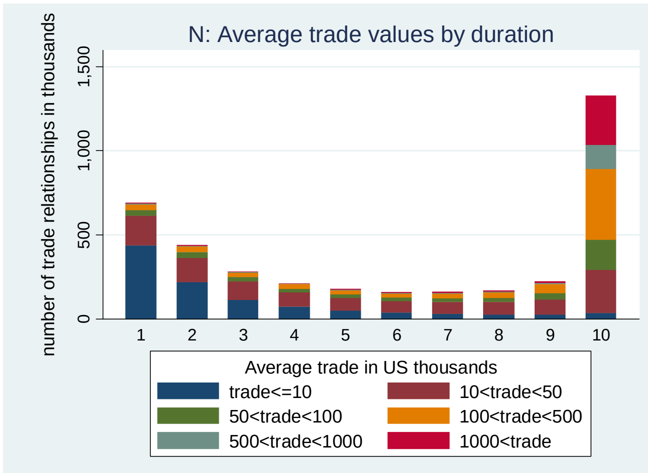
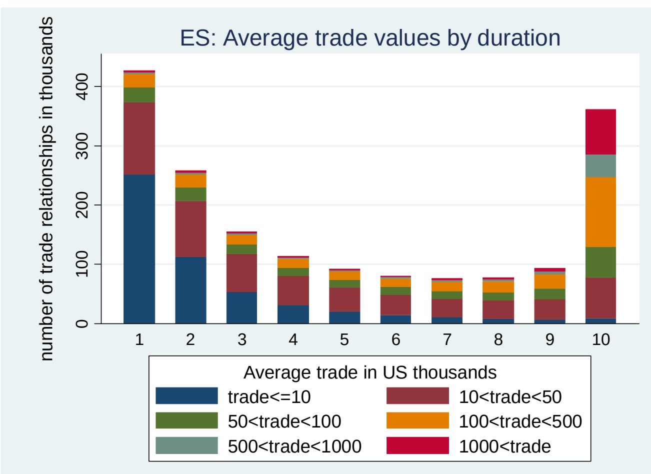
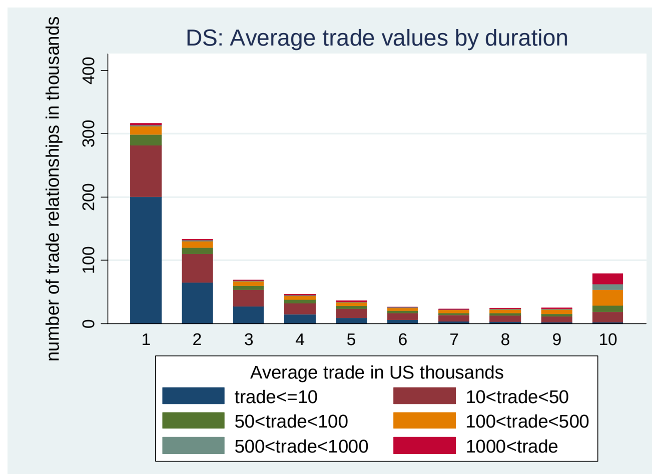
Appendix 1

[Figures a: Average trade values by duration in the North]

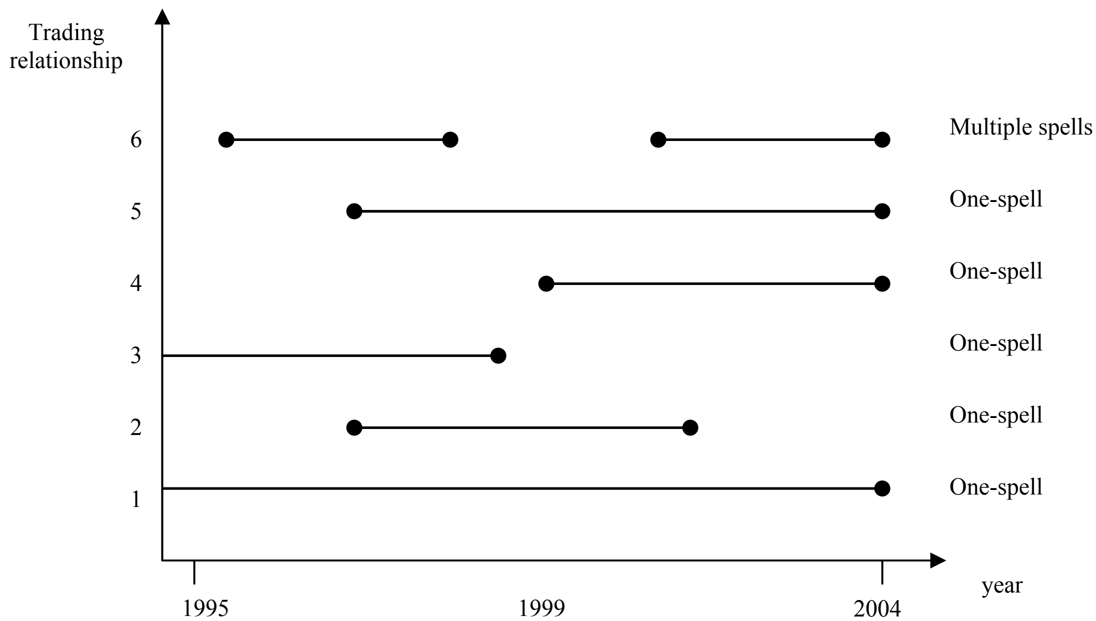


[Figures b and c: Average trade values by duration in the South]





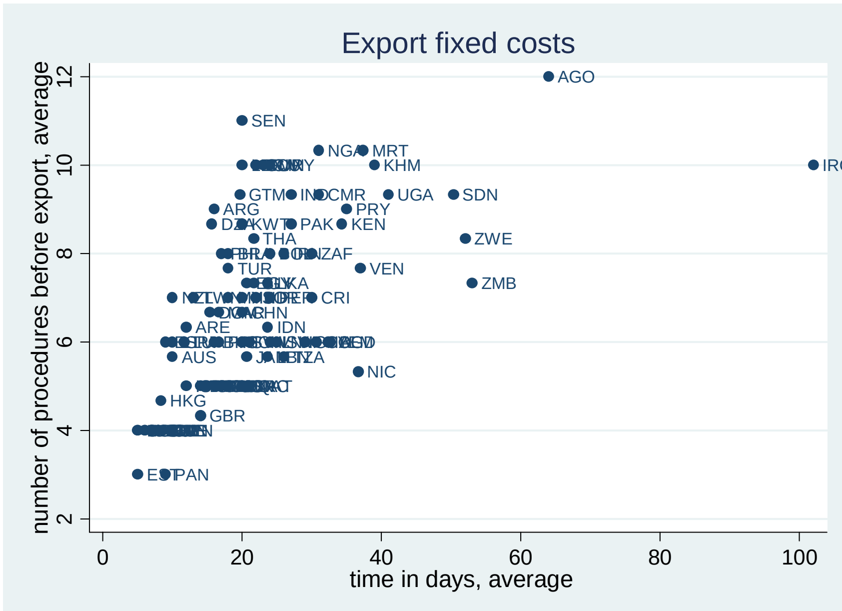
Appendix 2

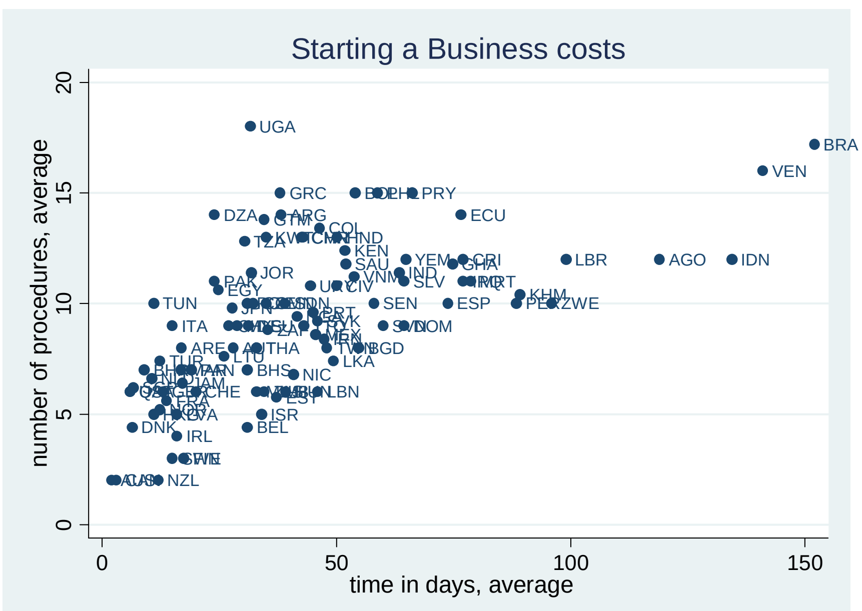

Trading relationship
6
5
4
3
2
1
Multiple spells
One-spell
One-spell
One-spell
One-spell
One-spell
1995
1999
2004
year

Appendix 3

variables	description	source
GDP per capita	in US PPP for the 1994-2005 period.	IMF
distance	Distance in Km between the two largest cities in each country.	CEPII
border	Dummy variable, equals 1 if common border.	CEPII
landlocked	Dummy variable, equals 1 if country is landlocked.	CEPII
common language	Dummy variable, equals 1 if common language.	CEPII
colonial link	Dummy variable, equals 1 if colonial relationship.	CEPII
Depreciation rate	The change in the exchange rate by spell. The exchange rate is the nominal value of national currency per USD dollars for the 1994-2005 period.	World Development Indicators
Competition	Average number of countries that export product X, over the spell.	Author's calculations
Tariffs	Weighted applied tariff from the database "Trade, Production and Protection, 1976-2004", 3-digit level (ISIC, rev2).	World Bank, Nicita A. and M. Olarreaga (2006)
Business costs (entry regulations)	Include the number of procedures and the time until the process is complete before a business can be established. (2004-2008)	Doing Business, WB
Export costs (Trading across borders)	Include the number of export procedures and time until the procedures are completed (2006-2008).	Doing Business, WB
Import costs (Trading across borders)	Include the number of import procedures and time until the procedures are completed (2006-2008).	Doing Business, WB

Appendix 4


Export fixed costs
number of procedures before export, average
time in days, average
2
4
6
8
10
12
0
20
40
60
80
100


Starting a Business costs
number of procedures, average
time in days, average
0
5
10
15
20
0
50
100
150

Appendix 5

exporter	region	exporter	region	exporter	region
Algeria	DS	Taiwan, China	DS	Australia	N
Angola	DS	Tanzania	DS	Austria	N
Bahamas	DS	Trinidad and Tobago	DS	Belgium	N
Bahrain	DS	Tunisia	DS	Canada	N
Bangladesh	DS	Uganda	DS	Czech Republic	N
Bolivia	DS	United Arab Emirates	DS	Denmark	N
Cambodia	DS	Uruguay	DS	Estonia	N
Cameroon	DS	Vietnam	DS	Finland	N
Costa Rica	DS	Yemen	DS	France	N
Cote d'Ivoire	DS	Zambia	DS	Germany	N
Dominican Republic	DS	Zimbabwe	DS	Greece	N
Ecuador	DS			Hungary	N
El Salvador	DS			Ireland	N
Ghana	DS	Argentina	ES	Israel	N
Guatemala	DS	Brazil	ES	Italy	N
Honduras	DS	Chile	ES	Japan	N
Iran	DS	China	ES	Latvia	N
Jamaica	DS	Colombia	ES	Lithuania	N
Kenya	DS	Egypt	ES	Netherlands	N
Kuwait	DS	Hong Kong, China	ES	New Zealand	N
Lebanon	DS	India	ES	Norway	N
Liberia	DS	Indonesia	ES	Poland	N
Mauritania	DS	Jordan	ES	Portugal	N
Mauritius	DS	Malaysia	ES	Slovakia	N
Nicaragua	DS	Mexico	ES	Slovenia	N
Nigeria	DS	Morocco	ES	Spain	N
Oman	DS	Pakistan	ES	Sweden	N
Panama	DS	Peru	ES	Switzerland	N
Paraguay	DS	Philippines	ES	United Kingdom	N
Qatar	DS	Singapore	ES	United States	N
Saudi Arabia	DS	South Africa	ES		
Senegal	DS	Thailand	ES		
Sri Lanka	DS	Turkey	ES		
Sudan	DS	Venezuela	ES		

Appendix 6: Duration models

Survival or duration methods were initially applied in medical and biological research to study the effect of certain independent variables on the occurrence of an event. Today duration models are also applied in labour economics (i.e. employment /unemployment duration), development economics (i.e. duration in poverty) and very recently in trade economics with the analysis of the duration of export activity.

General framework

In our framework, the event of interest is the "*death*", i.e. failure, of a trading relationship, i.e. exit from the export market.

Duration models assume there is a random continuous (general case) variable T, whose distribution is specified by:

- a cumulative distribution function *(cdf):* $F(t) = \Pr(T < t)$,which gives the probability of the event taking place by time t and
- a probability density function *(pdf):* $f(t) = \frac{dF(t)}{dt}$

The survival function S(t) is defined as the complement of the cdf and thus gives the probability of being alive at duration t:

$$S(t) = \Pr(T \geq t)$$

$$S(t) = 1 - F(t)$$

Another key component in duration models is the Hazard function *h(t)*, also called instantaneous rate of occurrence of the event. It is given by

$$h(t) = \lim_{dt \to 0} \frac{\Pr\{t < T < T + dt | T > t\}}{dt}$$

Which can be written (after a few computations) as:

$$h(t) = \frac{f(t)}{S(t)}$$

The hazard rate corresponds to the ratio of the probability of failure to the probability of survival. In the continuous time case it can be interpreted as the risk of an event to happen (i.e. instantaneous rate of occurrence) by t, while in the discrete time case it is simply seen as the conditional probability that the event will occur in time t, given that it has not occurred before. There is a large family of survival models that can be used for continuous or discrete time cases to analyze the effect of certain covariates on the hazard rate. The most general version of the hazard rate model is given by:

$$h_i(t, x_i(t)) = h_0(t)e^{\beta(t)'x_i(t)}$$

Where $x_i(t)$ is a vector of time-varying covariates representing the characteristics of individual *i* at time t, $\beta(t)$ is a vector of time-dependent coefficients, accounting for the effect that those characteristics have at time *t* (i.e. the effect of covariates varies across time). Within this family of survival models, the Cox (1972) model has the advantage that it does not need to specify the distribution of the duration dependency and so it is appropriate when we assess the impact of explanatory variables on the hazard rate. The hazard rate in the Cox model is given by:

$$h_i(t) = h_0(t)e^{\beta' x_i}$$

Where $h_0(t)$ is the baseline hazard function, which is assumed to be unknown and left unparametrized. The term $h_0(t)$ represents the risk at time t when $x_i(t) = 0$ and $\beta' x_i$ are time-independent covariates.

Interpretation of the coefficients of the explanatory variables

The interpretation of the coefficients of the explanatory variables depends on the model specification and do not have the same interpretation as in a linear model. The sign of the coefficient indicates the direction of the effect of the covariate on the risk of experiencing the event by t. In other words, the sign indicates whether some particular variable increases or decreases the hazard rate. The percentage change in the risk of experiencing the event in the case of a dichotomous covariate is given by:

$$\Delta\% h(t) = 100 * \frac{e^{\beta_k * 1} - e^{\beta_k * 0}}{e^{\beta_k * 0}} = 100 * \left(e^{\beta_k * 1} - 1\right)$$

In the case of a continuous covariate the percentage change in the hazard rate for a δ unit change in the explanatory variable x is given by:

$$\Delta\% h(t) = 100 * \frac{e^{\beta_k * (x+\delta)} - e^{\beta_k * x}}{e^{\beta_k * x}} = 100 * \frac{e^{\beta_k * x} e^{\beta_k * \delta} - e^{\beta_k * x}}{e^{\beta_k * x}}$$
$$= 100 * \left(e^{\beta_k * \delta} - 1\right)$$

A value larger than one indicates a positive effect, a value between zero and one a negative effect on the hazard rate. A value equal to one means the covariate does not have any effect on the hazard rate.

Appendix 6: Results

Table 1: Cox proportional hazard ratios estimates

	All countries		
variables	**reg1**	**reg2**	**reg3**
exporter GDP (log)	0.933***	0.902***	0.901***
importer GDP (log)	1.001	0.972***	0.972***
average trade value (log)	0.828***	0.829***	0.830***
common language	0.985***	0.982***	0.982***
border	0.923***	0.937***	0.937***
colonial link	0.939***	0.935***	0.935***
landlocked	1.082***	1.080***	1.081***
distance (log)	1.089***	1.093***	1.093***
change_ER	0.960***	0.957***	0.957***
average_competition	0.986***	0.985***	0.985***
multiple_spells	1.988***	1.974***	1.973***
differentiated goods	0.930***	0.931***	0.931***
homogeneous goods	1.083***	1.079***	1.081***
business (time)		0.931***	0.941***
export costs (time)		0.936***	0.981***
import costs (time)		0.903***	0.869***
trade value(log) * business(time)			0.996***
trade value(log) * exp. costs(time)			0.980***
trade value(log) * imp. costs(time)			1.016***
region DS	1.221***	1.254***	1.251***
region ES	0.919***	0.931***	0.932***
Countries	96	96	96
Observations	3,517,835	3,517,835	3,517,835

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table 2a: Cox proportional hazard ratios estimates

	Developing South			
variables	**reg1**	**reg2**	**reg3**	**reg4**
exporter GDP (log)	0.932***	0.931***	0.931***	0.939***
importer GDP (log)	1.005***	0.971***	0.970***	0.972***
logvalue	0.846***	0.847***	0.844***	0.797***
common language	1.033***	1.035***	1.035***	1.058***
border	0.935***	0.952***	0.951***	1.010**
colonial link	1.045***	1.016***	1.017***	1.000
landlocked	1.100***	1.067***	1.070***	0.965***
distance (log)	1.064***	1.076***	1.075***	1.051***
change_ER	0.989***	0.990***	0.989***	0.999***
average_competition	0.993***	0.992***	0.992***	0.995***
multiple_spells	1.687***	1.694***	1.694***	1.595***
differentiated goods	0.934***	0.935***	0.935***	0.930***
homogeneous goods	1.001	0.989	0.985	0.996
business		0.885***	0.927***	0.957***
export costs		1.046***	0.984***	1.127***
import costs		0.878***	0.869***	0.878***
trade value(log) * business			0.981***	0.989***
trade value(log) * exp. Costs			1.026***	1.235***
trade value(log) * imp. Costs			1.004***	0.993***
time(log)*export costs				0.283***
Countries	45	45	45	45
Observations	632,810	632,810	632,810	632,810

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2b: Cox proportional hazard ratios estimates

	Emerging South			
variables	**reg1**	**reg2**	**reg3**	**reg4**
exporter GDP (log)	1.043***	0.965***	0.963***	0.945***
importer GDP (log)	1.021***	0.985***	0.985***	0.980***
logvalue	0.824***	0.825***	0.843***	0.787***
common language	0.956***	0.976***	0.975***	0.976***
border	0.943***	1.000	1.001	1.014***
colonial link	1.157***	1.122***	1.120***	1.089***
distance (log)	1.057***	1.085***	1.086***	1.082***
change_ER	0.850***	0.845***	0.843***	0.851***
average_competition	0.986***	0.985***	0.985***	0.987***
multiple_spells	2.179***	2.149***	2.148***	1.795***
differentiated goods	0.905***	0.902***	0.902***	0.930***
homogeneous goods	1.115***	1.107***	1.106***	1.053***
business		0.891***	0.895***	0.908***
export costs		0.887***	0.992	1.238***
import costs		0.887***	0.866***	0.874***
trade value(log) * business			0.998	1.014***
trade value(log) * exp. Costs			0.955***	1.203***
trade value(log) * imp. Costs			1.010***	1.007***
time(log) * exp. costs				0.244***
Countries	21	21	21	21
Observations	1,106,195	1,106,195	1,106,195	1,106,195

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2c: Cox proportional hazard ratios estimates

	North			
variables	**reg1**	**reg2**	**reg3**	**reg4**
exporter GDP (log)	0.587***	0.578***	0.578***	0.589***
importer GDP (log)	0.993***	0.975***	0.975***	0.976***
logvalue	0.835***	0.835***	0.827***	0.822***
common language	0.972***	0.963***	0.964***	0.960***
border	0.826***	0.824***	0.824***	0.836***
colonial link	0.812***	0.820***	0.821***	0.829***
landlocked	1.041***	1.044***	1.045***	1.033***
distance (log)	1.144***	1.146***	1.145***	1.140***
change_ER	1.819***	1.816***	1.821***	1.965***
average_competition	0.972***	0.972***	0.972***	0.973***
multiple_spells	1.777***	1.770***	1.768***	1.716***
differentiated goods	0.947***	0.948***	0.948***	0.955***
homogeneous goods	1.093***	1.093***	1.093***	1.091***
business		0.964***	0.962***	0.943***
export costs		0.977***	1.041***	1.266***
import costs		0.938***	0.882***	0.886***
trade value(log) * business			1.000	0.993***
trade value(log) * exp. costs			0.974***	1.156***
trade value(log) * imp. costs			1.026***	1.025***
time (log)*export costs				0.365***
countries	30	30	30	30
Observations	1,778,830	1,778,830	1,778,830	1,778,830

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table 3: Cox proportional hazard ratios estimates

	All countries only manufactures		
variables	**reg1**	**reg2**	**reg3**
exporter GDP (log)	0.928***	0.897***	0.896***
importer GDP (log)	1.000	0.970***	0.969***
average trade value (log)	0.826***	0.826***	0.826***
common language	0.976***	0.973***	0.973***
border	0.903***	0.917***	0.917***
colonial link	0.946***	0.945***	0.944***
landlocked	1.075***	1.075***	1.076***
distance (log)	1.082***	1.086***	1.087***
change_ER	0.955***	0.952***	0.952***
coef_var	0.986***	0.986***	0.986***
average_competition	0.986***	0.985***	0.985***
multiple_spells	2.013***	1.997***	1.996***
differentiated goods	0.925***	0.926***	0.926***
homogeneous goods	1.083***	1.079***	1.080***
business (time)		0.927***	0.941***
export costs (time)		0.940***	0.984***
import costs (time)		0.903***	0.857***
trade value(log) * business(time)			0.994***
trade value(log) * exp. costs(time)			0.981***
trade value(log) * imp. costs(time)			1.021***
reg2	1.245***	1.277***	1.274***
reg3	0.921***	0.932***	0.933***
Observations	2,716,330	2,716,330	2,716,330

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4a: Cox proportional hazard ratios estimates

	Developing South			
variables	**reg1**	**reg2**	**reg3**	**reg4**
exporter GDP (log)	0.932***	0.907***	0.907***	0.921***
importer GDP (log)	1.005***	0.970***	0.970***	0.973***
logvalue	0.846***	0.847***	0.835***	0.777***
common language	1.033***	1.023***	1.023***	1.052***
border	0.935***	0.945***	0.943***	1.009**
colonial link	1.045***	1.016***	1.015***	1.003
landlocked	1.100***	1.131***	1.133***	0.992**
distance (log)	1.064***	1.073***	1.072***	1.037***
change_ER	0.989***	0.989***	0.989***	0.999***
average_competition	0.993***	0.992***	0.992***	0.996***
multiple_spells	1.687***	1.686***	1.685***	1.570***
differentiated goods	0.934***	0.938***	0.938***	0.930***
homogeneous goods	1.001	0.997	0.993	0.997
business (time)		0.946***	0.969***	0.978***
import costs (time)		0.876***	0.867***	0.881***
export cost (cat2)		1.090***	0.996	1.163***
export cost (cat3)		0.911***	0.864***	1.056***
trade value(log) * exp. costs(cat2)			1.041***	1.261***
trade value(log) * exp. costs(cat3)			1.023***	1.261***
time(log) * exp. costs(cat2)				0.276***
time(log) * exp. costs(cat3)				0.256***
trade value(log) * business(time)			0.991***	0.995**
trade value(log) * imp. costs(time)			1.004***	0.993***
countries	45	45	45	45
Observations	632,810	632,810	632,810	632,810

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table 4b: Cox proportional hazard ratios estimates

	Emerging South			
variables	**reg1**	**reg2**	**reg3**	**reg4**
exporter GDP (log)	1.043***	1.065***	1.063***	0.974***
importer GDP (log)	1.021***	0.986***	0.986***	0.977***
logvalue	0.824***	0.826***	0.847***	0.694***
common language	0.956***	0.943***	0.943***	1.005*
border	0.943***	0.995	0.997	1.052***
colonial link	1.157***	1.139***	1.137***	1.056***
distance (log)	1.057***	1.087***	1.088***	1.066***
change_ER	0.850***	0.846***	0.846***	1.035***
average_competition	0.986***	0.984***	0.984***	0.992***
multiple_spells	2.179***	2.182***	2.180***	1.586***
differentiated goods	0.905***	0.907***	0.908***	0.949***
homogeneous goods	1.115***	1.101***	1.100***	1.038***
business (time)		0.846***	0.887***	0.945***
import costs (time)		0.886***	0.870***	0.899***
export cost (cat2)		1.080***	1.174***	1.814***
export cost (cat3)		1.289***	1.278***	1.807***
trade value(log) * exp. costs(cat2)			0.966***	1.390***
trade value(log) * exp. costs(cat3)			1.001	1.388***
time(log) * exp. costs(cat2)				0.126***
time(log) * exp. costs(cat3)				0.139***
trade value(log) * business(time)			0.982***	1.008***
trade value(log) * imp. costs(time)			1.007***	1.001
countries	21	21	21	21
Observations	1,106,195	1,106,195	1,106,195	1,106,195

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table 4c: Cox proportional hazard ratios estimates

	North			
variables	**reg1**	**reg2**	**reg3**	**reg4**
exporter GDP (log)	0.587***	0.542***	0.542***	0.582***
importer GDP (log)	0.993***	0.975***	0.975***	0.974***
logvalue	0.835***	0.835***	0.829***	0.819***
common language	0.972***	0.950***	0.950***	0.947***
border	0.826***	0.825***	0.825***	0.882***
colonial link	0.812***	0.805***	0.806***	0.826***
landlocked	1.041***	1.035***	1.035***	1.037***
distance (log)	1.144***	1.144***	1.144***	1.128***
change_ER	1.819***	1.844***	1.851***	2.269***
average_competition	0.972***	0.971***	0.971***	0.974***
multiple_spells	1.777***	1.757***	1.755***	1.662***
differentiated goods	0.947***	0.948***	0.949***	0.959***
homogeneous goods	1.093***	1.094***	1.095***	1.090***
business (time)		1.010**	1.023***	1.001
import costs (time)		0.940***	0.887***	0.894***
export cost (cat2)		0.843***	0.865***	1.095***
export cost (cat3)		0.930***	0.948***	1.111***
trade value(log) * exp. costs(cat2)			0.989***	1.166***
trade value(log) * exp. costs(cat3)			0.992	1.163***
time(log) * exp. costs(cat2)				0.350***
time(log) * exp. costs(cat3)				0.365***
trade value(log) * business(time)			0.994***	0.989***
trade value(log) * imp. costs(time)			1.024***	1.021***
countries	30	30	30	30
Observations	1,778,830	1,778,830	1,778,830	1,778,830

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses