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Indonesian Trade: Understanding the Duration and the Determinants of Its Hazard Rate

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Abstract, Over the last two decades (1990-2011), Indonesian trade showed an increasing growth rate. The value of Indonesian exports and imports increased tenfold with other ASEAN countries and sixfold with non-ASEAN countries. During this period, Indonesian trade was dominated by trade with non-ASEAN countries (>79%), while intra-ASEAN accounted for almost 21%.

In order to have trades occur in the first place, it is important to have not only a flourishing trade flows but also sustainable ones (Hess and Persson, 2011). Therefore, it is important to understand the process by which trades are sustained and trade flows grow in volume. Regarding the important role of trade duration, it's crucial to investigate those of Indonesian trade with its partners. Therefore, this paper tries to explore the duration of Indonesian trade and to identify the factors that affect its hazard rate. This paper offers a new insight to accumulated studies of Indonesian trade which rarely discuss the impact of trade duration. This study uses discrete time-of-duration analysis which is suitable for trading data and repeated events, and is the first to apply the concept of duration to Indonesian trade.

In our aim to explore the duration of Indonesian trade, we start by performing a thorough descriptive analysis. We found that most of Indonesian trade flows are short-lived; the median duration is merely 2 years for all spells, independent of whether one considers imports or exports. However, some trade flows last longer. These consist of essential imports such as wheat and export goods in which Indonesia has a strong comparative advantage (e.g. palm oil, rubber). Moreover, in many instances there is evidence of trade being frequently interrupted ('stopped and re-started').

In our aim to identify the factors that affect the hazard rate, we performed a separate regression analysis for import and export. We estimate the baseline specification using discrete-time probit, logit, and cloglog models which include random effects for every partner-product-trade flow combination. We found factors that have impacts on hazard rate of stopping import (export) are distance, partner countries, initial trade value, market size, supplier size (only for import), the growth of credit ratio, exchange rate and product type. Moreover, we found that trading with developed countries as well as trading differentiated product has a lower hazard rate of stopping trade.

Keywords: Duration of trade, Discrete-time of Duration Analysis, ASEAN

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1. Introduction

Over the last two decades (1990-2011), Indonesian trade showed an increasing growth rate. The value of Indonesian exports and imports increased tenfold in nominal US dollar terms with other ASEAN countries and sixfold with non-ASEAN countries. These indicate that, in general, Indonesian trade is growing. In addition, Indonesian trade was dominated by trade with non-ASEAN countries (>79%), while intra-ASEAN accounted for almost 21% (Table 1 and Figure 6).

In order to have trades occur in the first place, it is important to have not only a growing trade flows but also sustainable ones because factors causing existing trade flows to die could be as much of an impediment to long-term trade growth (Hess and Persson, 2011). Therefore, from a practical policy point of view it is important not only to understand the factors driving entry into trading but also to understand the process by which trades are sustained and trade flows grow in volume. For instance, in regards to export, successful export growth and diversification require not only entry into exporting but survival (i.e. ability of a given country to continue trading a particular product to a particular destination from year to year) and subsequent growth (Brento, Pierola, and Uexkull, 2009).

Regarding the important role of trade duration, it’s crucial to investigate those of Indonesian trade. Therefore, the general objective of this study is to identify the pattern of Indonesian trade with its partners during 2000-2011. The specific purposes are to explore the duration of Indonesian trade, and to identify the factors affecting the hazard rate. This paper tries to answer the following questions: (1) How long is the duration of Indonesian trade? (2) What factors affect the hazard rate of Indonesian trade? (3) Which bilateral trade has a lower hazard rate? (4) Which commodity has a lower hazard rate?

This paper offers a new insight to accumulated studies of Indonesian trade which rarely discussed on trade duration. Despite an emerging body of literature on trade at the country-product level, the duration of trade has not received much attention until very recently. Moreover, most of the previous studies on trade duration used Kaplan Meier and Cox Model which were limited to one-spell observation or only for the first spell of multiple-spell observation, contrast to the fact that trade data showed multiple-event characteristic (Brento, Pierola, and Uexkull, 2009). This study uses discrete-time of duration analysis which is suitable for trading data and be the first to apply on Indonesian trade with ASEAN as well as non-ASEAN countries.

This paper focuses on Indonesian bilateral trade relationships (import and export) with partners of four (4) ASEAN countries, namely Philippines, Malaysia, Thailand, and Singapore, and four major trading partners, i.e., Japan, 27 Europe Union Countries [EU (27)], China, and the United States (US) from 2000 to 2011.

The remainder of the paper is organized as follows. Section 2 offers an overview of the relevant empirical and theoretical literature. The data and empirical strategy are outlined in Section 3, followed by a descriptive analysis of the Indonesian trade duration in Section 4. Section 5 presents the regression analysis, and Section 6 summarizes and concludes.

2. Literature Studies

The studies concerning trade duration is quite limited. The first research on trade duration by Besedes and Prusa (2006a, 2006b) has shown that the duration of trade relationships in the US tend to be short with numerous entries and exists (leading to multiple spells) in a market. Using data on US imports at the 7-digit (US Tariff Schedule) level from 160 exporters for 1972–1988 to estimate Kaplan–Meier survival functions, their results suggest that the duration of exports to the United States is in general very short. The estimated survival rate is 67% for the first year, thereafter decreasing at a decreasing rate.

As their companion paper, Besedes and Prusa (2006b) make use of the same US import data as Besedes and Prusa (2006a). Basing their investigation on the model by Rauch and Watson (2003), they add the Rauch (1999) classification of goods into homogeneous, reference-priced and differentiated. Applying a Cox proportional hazards model, which—unlike the Kaplan–Meier methodology—enables them to include explanatory variables in their analysis, they find that differentiated products have lower hazard rates than homogeneous goods. They also find that, within each product type, the larger the initial value of the trade flow, the longer the duration.

The prevalence of short-lived trade relationships has been also found in (Nitsch, 2009) for German imports; Besedes and Blyde (2010) for the exports from Latin American countries; Brento, Pierola, and Uexkull (2009) of developing countries export from 82 exporting countries to 53 importers; Rudi, Jason and Peterson (2012) of the US Fresh Fruit & Vegetable Market, and Obashi (2010) of Intra-East Asian machinery trade.

Nitsch (2009) examines the duration of German imports at the 8-digit (Combined Nomenclature) product level, using data from Eurostat for 1995–2005. Employing a stratified

Cox proportional hazards model, he investigates the effects of numerous regressors on the hazard rate. The conclusions are that exporter characteristics (such as GDP and language), product characteristics (such as unit values) and market characteristics (such as the import value, and market share) affect the duration of German imports.

Besedes and Prusa (2011) focus on the extensive and intensive margins of trade. Using data on manufacturing exports at the 4-digit Standard International Trade Classification (SITC) Revision 1 level from 46 countries to 181 importers for 1975–2003, they decompose export growth into three parts: establishing trade with new partners and markets (extensive margin); having relationships survive or persist, and deepening existing relationships(intensive margin). Estimating Kaplan–Meier survival functions for each of the Individual exporters, they find that export duration is very brief, with the median being 1–2 years.

Nevertheless, a study by Brenton, Sabarowski and Uexkull (2009) found that unobserved individual heteronegeity in product-level export flow data prevails, which questions previous studies that have used Cox Proportional hazards model to model export survival, e.g. (among others are) Besedes and Prusa (2006a); Obashi (2010); and Rudi, Jason and Peterson (2012). Brenton, Sabarowski and Uexkull (2009) look at the duration of export flows at the 5-digit SITC level from 82 exporters to 53 importers over the period 1985–2005, using a discrete time complementary log-log model to estimate the effects of various explanatory variables on the hazard rate. They found that trade in general was short-lived; also they found that the initial size of an export flow, cultural & geographic ties between trading partners, market size and exporting experience are important determinants of its survival.

In addition, a number of studies focused on factors affecting duration of trade. For instance, Fugazza and Molina (2009) evaluated trade of 96 countries during 1995 to 2004 using extended Cox model where the estimation coefficients are allowed to vary over duration time, found that duration of trade increases with the region level of development. Other factors such as type of product, export cost and the size of export also matter. Brento, Pierolla and Uexkull (2009) use a Cox model to estimate determinants of trade in a data set with 44 exporters and 56 importers over a 21-year period. Their research indicated that the size of initial export flow, search cost exchange rate volatility are factors of hazard rates.

Hess and Persson (2011) investigated the duration of EU imports from the rest of the world. They employed a rich data set of detailed imports to individual EU-15 counties from 14 non-EU exporters, covering the period 1962-2006. They performed descriptive analysis and regression analysis using discrete-time duration models with proper control for unobserved heterogeneity. They found that EU imports from the rest of the world are very short-lived, with median of 1-year. In addition, they found that a set of statistically significant determinants of the duration of trade. Among them is export diversification – the number of products exported and the number of market served with the given product- which lowering the hazard of trade flows from dying.

Among the previous papers on the duration of country-level trade flows, there exist a number of similarities. Not only do they all find the existence of short trade durations, but the majority also study much shorter time periods while using estimation methods that introduce risk of biases and misleading conclusions (see Hess and Persson 2012, for a discussion). However, at this point there is no given theoretical model that can fully explain the observed short trade durations. Neither *sunk cost theory* nor *product life cycle theory* could explain the short trade duration (Hess and Person, 2011). Most of the literature about Indonesian trade focused on factors that affect the Indonesian trade (value) relationship (e.g. Jongwanich, 2010); very limited focus was on the duration of the relationship. In addition, studies on international trade duration did not specifically explore the duration of Indonesian trade nor the factors affect it. Therefore, there is still a very wide space for research on Indonesian duration trade, in which improving survival rates is a key component of a country's trade strategy (Fugazza and Molina, 2009).

3. Methodology of Analysis

3.1 Duration (Survival) Analysis

Survival analysis involves the modeling of time to event data; in this context, death or failure is considered an "event". In this paper, the failure or event is Indonesia stop trading, that is stop importing (exporting) a specific product to (from) a specific partner, in other word exit the market. Survival analysis in econometric model is known as the duration models.

Duration analysis unifies a range of models from continuous to discrete time, from non-parametric to parametric and from those with or without accounting for unobserved heterogeneity between the subjects. The data used in this paper is at product-level, thus the survival rate refers to the product survival rate.

Table 1. Illustration for Counting the Number of Spells and (Total) Duration (Product-Data)

Product - Trade Flow	Trade Partners	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	No years in (duration)	# Spells
Petroleum gases – Export	Malaysia	X	X	X	X	X	X	X	X	X	X	X	X	12	1
	Thailand						X	X	X	X	X	X	X	7	1
	Philippines								X	X	X	X	X	5	1
	Singapore											X		1	1
	Japan							X						1	1
	US	X	X	X	X	X	X	X	X	X		X	X	11	2
	China		X	X					X	X	X	X	X	7	2
	EU (27)			X						X	X			3	2
Parts of vehicle – Import	Malaysia							X				X		2	2
	Thailand		X	X	X		X					X	X	6	3
	Philippines	X				X	X			X	X	X	X	7	3
	Singapore			X				X	X			X	X	5	3
	Japan				X						X		X	3	3
	US			X		X			X				X	4	4
	China	X	X		X		X		X				X	5	5
	EU (27)	X			X		X		X		X	X		6	5

For each calendar year, we observe the value of Indonesia's import (export) to (from) a partner at the 6-digit product level. For every combination of partner, traded product, and trade flow type (import/export), hereafter, referred to as a *trade relationship*, we calculate the duration of trade as the number of consecutive years with non-zero imports (exports). A *trade spell* is defined as a period of time with uninterrupted import (export) of a given product to (from) one specific partner country. These different spells of trade constitute the core units of analysis in our empirical study. The number of spells differs from the number of trade relationships since any of the trading parties may choose to terminate the trade relationship and receive it a later point in time. Henceforth, we will refer to such reoccurring trade relationships as *multiple spells* of service.

We use product-data to perform a descriptive analysis of the duration of Indonesia imports and exports, and we use product-period data to search for potential determinants of hazard rate in a formal regression analysis. The product-period data was constructed in a 12-year panel of product-period combination for each of the trade flow type (import/export). An event dummy variable is created, that is 1 if trade stopped in that respective period, 0 otherwise. Moreover, there are some covariates, that is time-invariant (e.g. dummy partner, initial trade value, etc), and time-variant variables (e.g. market/supplier size, exchange rate, growth of credit, etc).

3.2 Discrete-time model

A discrete time duration process is an approach to duration processes that consider events occur at discrete points in time. International trade is traditionally observed once a year, even though the underlying trade transactions may take place every day of the year, or, at the extreme, only once a year. This implies that the observed durations of trade will be grouped into yearly intervals. In general, this type of discrete duration data is known as discrete *grouped* duration data since observations are grouped in terms of the interval of time in which an event occurs.

Discrete-time survival models are specified in terms of the discrete-time hazard, defined as the conditional probability of the event occurring at a time point given that it has not already occurred. A conventional feature of these survival models is that they become models for dichotomous responses when the data have been expanded to so-called product-period data. Standard logit and probit models can then be used, as well as complementary log-log models (Beck, Katz, and Tucker, 1998).

We followed Hess and Persson (2012) who recommend the use of discrete-time models for trade duration analysis. In brief, the continuous time model, such as the Cox model, has three major drawbacks when applied to large trade data sets. First, it faces problems in the presence of many tied duration times, leading to biased coefficient estimates and standard error. Second, it is difficult to properly control for unobserved heterogeneity, which can lead to parameter bias and bias in the estimated survivor function. Third, the Cox model imposes the restrictive and empirically questionable assumption of proportional hazards. In contrast, with discrete-time models there is no problem handling ties; unobserved heterogeneity can be controlled without difficulty, and the restrictive proportional hazards assumption can easily be bypassed.

3.3 Empirical Models

Let Ti be a continuous, non-negative random variable measuring the survival time of a particular trade relation. In a discrete-time framework, the core of duration analysis is formed by the probability that a particular trade relation terminates in a given time interval $[t_k , t_{k+1})$, $k = 1, 2, \ldots, k_{\max}$, and $t_1 = 0$, conditional on its survival up to the beginning of the interval and given the explanatory variables included in the regression model. This conditional probability is termed the discrete-time hazard rate and formally defined as

$$h_{ik} := P(T_i < t_{k+1} \mid T_i \geq t_k, x_{ik}) = F(x_{ik}^{'}\beta + \gamma_k), \qquad (1)$$

where x_{ik} is a vector of possibly time-varying covariates, γ_k is a function of (interval) time that allows the hazard rate to vary across periods (somewhat loosely, we will refer to γ_k as the grouped-duration baseline hazard, although this is not formally correct in all instances), and *F(.)* is an appropriate distribution function ensuring that $0 \leq h_{ik} \leq 1$ for all *i, k*. In our case, the subscript *i* denotes separate spells of trade relationships $(i = 1, \ldots, n)$ for any given partner-product-trade flow type combination.

For each trade spell, the last year in which a positive trade volume was observed, can be recorded. In the following, this terminal time period is denoted k_i , the subscript *i* indicating that it may differ across spells. Introducing a binary variable, y_{ik} , taking the value one if spell *i* is observed to cease during the *k*th time interval, and zero otherwise, the log-likelihood for the observed data is given by:

$$\ln L = \sum_{i=1}^{n}\sum_{k=1}^{k_i}[y_{ik}\ln(h_{ik}) + (1-y_{ik})\ln(1-h_{ik})] \qquad (2)$$

This expression is structurally isomorphic to a standard log-likelihood function for a binary panel regression model with dependent variable y_{ik}[3]. This allows discrete time hazard models to be estimated by binary dependent variable methods and time-varying covariates to be incorporated.

To be able to estimate the model parameters, a functional form for the hazard rate h_{ik} needs to be specified. The most commonly encountered functional specifications are the normal, logistic, and extreme-value minimum distribution, leading to a probit, logit, or cloglog model, respectively. In addition, unobserved heterogeneity can be accounted for by including random effects into the binary choice model framework above. Applying conventional binary response panel data models with normal random effects is a sensible approach when estimating discrete-time duration models (Hess and Person, 2012).

[3] To obtain consistent parameter estimates from this log-likelihood, each spell must be independent of all other spells, censoring must occur only at interval boundaries, and censoring must not provide any information about *Ti* beyond that available in the covariates (see e.g., Singer and Willett 1993 for excellent surveys on the derivation of the likelihood).

3.4 Link Functions

In our aim to identify factor affecting hazard rate, we start by making the hazard rate of stopping import (export), conditional on covariates as well as survival as in equation (1). We need an admissible distribution function. Three are common, logit, probit and cloglog.

The notion of unobserved heterogeneity amounts to observations being conditionally different (heterogeneous) in terms of their hazards in ways that are unaccounted for in the systematic part of our models, which can be particularly bad in duration models (i.e., spurious duration and/or inconsistent estimation). Therefore, in order to relax the assumption of conditional independence among the responses for the same items (partner-product combination) given the covariates, we can include a product-specific random intercept ζ_i in the linear predictor to obtain a random-intercept logistic regression model:

A. Logit $$\log\left(\frac{h_{ik}}{1-h_{ik}}\right) = x'_{ik}\beta + \gamma_k + \zeta_i \qquad (3)$$

The random intercepts $\zeta_i \sim N(0,\psi)$ are assumed to be independent and identically distributed across items i and independent of the covariates x'_{ik}. The random intercept can be thought of as the combined effect of omitted item-specific (time-constant) covariates that cause some items to be more prone to stop being traded than others. It is appealing to model this unobserved heterogeneity in the same way as observed heterogeneity by simply adding the random intercept to the linear predictor. Odds ratios obtained by exponentiating regression coefficients in this model must be interpreted conditionally on the random intercept and are therefore often referred to as conditional or subject-specific odds ratios.

B. Probit $$h_{ik} = \phi\left(x'_{ik}\beta + \gamma_k + \zeta_i\right) \qquad (4)$$

C. Cloglog $$h_{ik} = 1 - \exp\{-\exp\{x'_{ik}\beta + \gamma_k + \zeta_i\}\} \qquad (5)$$

3.5 Data /Materials

This paper uses annual bilateral export and import data at the six-digit level of Harmonized System (HS) 1996 from 2000 to 2011 obtained from the UN Comtrade. The HS six-digit level is the most detailed disaggregated level of trade data that is internationally comparable and publically available. Moreover, this paper also utilizes data of DOT IMF, bilateral gravity data from EPII, WDI-WB, ASEAN Statistics, IFS-IMF, and UN Statistics.

The variables that are used in this study are common variables in a gravity model. The gravity variables have been very successful in explaining trade volumes; therefore, they might have a role in explaining the duration of trade as well (Besedes and Blyde, 2010). All the continuous variables are in logarithm form, except growth of credit ratio. Due to multicollinearity problem, variable log of credit ratio is replaced by growth of credit ratio.

4. Trade Pattern Analysis

4.1 Trade Duration

In our aim to explore the duration of Indonesian trade, we start by performing a thorough descriptive analysis. Table 5 offers some initial summary statistics as to the length of Indonesian trade flows. As it can be seen, the median duration of all spells is 2 years, both for import and export. The most common scenario is, in other words, for Indonesia to go from not importing (exporting) the product from (to) partner's market for at most 2 years, only to then leave the market again. The mean duration of more than 4 years for import and more than 3 years for exports are also rather low.

Table 2. Summary Statistics

IMPORT

Type of spell	Length of Observed spell		Total number of spells	Fraction of spells left-censored	Total number of trade relationships	Total number of product codes
	Median	Mean				
All spells	2	4.756	59,594	0.29	35,355	5,098
Single spell	12	9.149	19,634	0.65	19,634	4,926
First spells	4	6.187	35,355	0.36	35,355	5,098

EXPORT

Type of spell	Length of Observed spell		Total number of spells	Fraction of spells left-censored	Total number of trade relationships	Total number of product codes
	Median	Mean				
All spells	2	3.706	57,252	0.12	32,521	5,027
Single spell	9	7.055	16,207	0.43	16,207	4,832
First spells	2	4.704	32,521	0.22	32,521	5,027

Table 2 also shows the median and means for other type of spell that is single-spell and first-spell. Single spells, i.e. observations where a specific partner-product-trade flow type combination has only one single coherent period of trade. In addition, we disregard all higher-order spells to see whether the first observed spell has different characteristics. Even though the number of observations is drastically reduced (implying that we have a substantial amount of trade flows that die and then reoccur), the median duration of trade is 4 years (import) and is only 2 years (export) for first spell, while the median is 12 year (import) and 9 years (export) for single-spell.

The first-spell type indicates similar patterns but a bit longer duration before the trade terminated (for the first time). The median of trade durations are 4 years for import and 2 year for export, while the mean are more than 6 years and more than 4 years for import and export respectively. On the other hand, the single-spell type shows that the median duration for import and export are 12 years and 9 years, respectively, with mean 9 years (import) and 7 years (exports). These indicate that for certain products, trade is long lasting.

Comparing the all spell figure to with what has been found for other countries; Indonesian trade appears to be at least as short-lived. For instance, Hess and Person (2011) find a corresponding median duration of 1 year for EU imports, while Besedes and Prusa (2006a) find 2-year median duration for US imports at the same level of data aggregation (with mean of over 4 years). Nitsch (2009), who uses much more detailed data, finds a median duration of 2 years for German imports, suggesting that German imports are more long-lived than imports to other EU-15 countries. Moreover, Besedes and Blyde (2010) found evidence confirming that export relationships in Latin America are in general short-lived but that significant differences across regions exist with Latin America exhibiting lower export survival rates than the US, the EU and East Asia, among others. Thus, the data suggest that Indonesian trades are at least as short-lived as those for other countries and possible even more so.

Focusing now on the length of a spell before it terminated (see Table 6 in appendix), we found that for import, more than one-third of all spells cease during the first year of service. Approximately 50% of all trade flows terminate within the first 2 years, and less than 8% of trade flows last only a maximum of 3 years; meaning that after serving for several years, trade flow stopped. In addition, less than 1% of all relationships survive for the first 11 years. However, a moderate percentage that is, more than 21% of trade, occurred for 12 years, without any break exiting the market, which points out that for certain products, once trade was established, it survived. In the same way, single-spell and first-spell types also showed a similar duration. Thus, the vast majority of spells will last only for at most a few years and only a small fraction can be characterized as long-lasting.

Similarly, export trade also indicated a typical pattern with those of import. More than 60% of all observed spells exist only within the first two years of service. On the other hand, more than 12% last for 12 years, as once trade started it survived without exiting the market. These are also parallel to those of single-spell and first-spell. Our conclusion so far is that Indonesian trades are short-lived.

4.2 Trade Stability

Table 3 depicts the stability of import and export that is the number of consecutive years of positive trading (spells). The more the number of spells, the more the number of breaks (stop trading) and trade reoccurrence. As it can be seen more than 55% of trade last in one spell, i.e. after serving for several years then it stopped. While more than a quarter of trade was occurred in two spells. On the other hand, less than 20% of trade established with more than 3 spells which were disrupted for more than two times of exiting the market. These indicate that Indonesian import and export trade were quite stable, a small portion that is multi-event characteristic, i.e. multiple entries and exits the market. For some years trade occurred then in the next year is stopped, and by the next year it started again.

Therefore, from the above explanation regarding Indonesian trade duration and stability we can conclude that Indonesian trades are generally short-lived, while some products enjoy a long-lasting trade relationship; yet it is quite stable with a small portion of multiple exits and entries of the market.

Table 3. Number of Trade Relationship by Spell Numbers

Import					Export				
Spell No	Freq.	Percent	Cum.	Total #spells	Spell No	Freq.	Percent	Cum.	Total #spells
1	19,634	55.53	55.53	19,634	1	16,207	49.84	49.84	16,207
2	9,074	25.67	81.2	18,148	2	9,718	29.88	79.72	19,436
3	4,952	14.01	95.21	14,856	3	4,960	15.25	94.97	14,880
4	1,522	4.3	99.51	6,088	4	1,456	4.48	99.45	5,824
5	170	0.48	99.99	850	5	175	0.54	99.98	875
6	3	0.01	100	18	6	5	0.02	100	30
Total	35,355	100		59,594	Total	32,521	100		57,252

5. Regression Analysis

In our aim to identify the factors affecting the hazard rate, we performed a separate regression analysis for import and export. We estimate the baseline specification using discrete-time probit, logit, and cloglog models. All left-censored observations, which, if included, could lead to bias in the estimated hazard rate (Hess and Persson, 2012), are excluded. In all models, we include random effects for every partner-product-trade flow combination.

5.1 Results

The results of the estimations can be found in Table 12. As we can see that for both import and export estimations:

1. Based on the probability of Likelihood Ratio (LR), the coefficient is statistically different from zero. Therefore, we conclude that the model fit the data well. The logit model gave the highest log likelihood value.
2. Likelihood-ratio tests strongly reject the null hypothesis of no latent heterogeneity for all model specifications (ρ =0), implying that unobserved heterogeneity plays a significant role in all model specifications and should not be ignored.
3. All of the variables are statistically significant, except supplier size for export, with sign of the coefficients are as expected.

In the trade literature, two countries with a short distance between them are often expected to have lower costs for trading. It seems reasonable to assume that, everything else being equal, higher trade costs should make a trading relationship more vulnerable to negative shocks and increase the likelihood of failure. Therefore we would expect distance to increase the hazard. To control for this factor we include the logarithm of the distance between the trading countries' capitals. The estimated parameters for import and export support these hypotheses: distance has a significantly positive coefficient.

We included dummy variable for trading with developed countries, that is Japan, US, and EU(27) to see if there is any difference between trading with developed countries and with developing countries. Fugazza and Molina (2009) found that trading with developed countries has a lower hazard rate than those involving developing countries. Thus, the hypothesis would be trading with developed countries would have a lower hazard rate. This hypothesis is supported by the result, that is having developed countries as partners of import (export) have longer-lasting relationships than import (export) flows from developing countries.

Table 4. Factors Affecting Trade Duration

Variables/Indicators	Model			
	Logit		Probit	Cloglog
	Log-odds	Odds Ratio		
IMPORT				
Log Distance	0.514854***	1.673395***	0.300776***	0.323749***
Developed Country Dummy	-0.39716***	0.672226***	-0.23074***	-0.24515***
Log Initial Trade Value	-0.10342***	0.901751***	-0.06054***	-0.06819***
Log Market Size (GDP Indo)	-0.18921***	0.827612***	-0.11257***	-0.10169***
Log Supplier Size (GDP partners)	-0.32166***	0.724947***	-0.18851***	-0.20595***
Growth Credit Ratio	-0.00564***	0.994378***	-0.00332***	-0.00363***
Log Real Exchange Rate	0.137567***	1.147479***	0.080696***	0.088371***
Differentiated Product Dummy	-0.3644***	0.694615***	-0.21371***	-0.23728***
Constant	10.84521***	N/A	6.407773***	6.017986***
Observations	130,020	130,020	130,020	130,020
No. of spells	46,807	46,807	46,807	46,807
Trade relations	22,568	22,568	22,568	22,568
Log likelihood	**-164,851.21**	-164,851.21	-165,120.23	-165,670.86
Prob LR coeff=0	0.000	0.000	0.000	0.000
ρ	0.302218	0.302218	0.330073	0.271447
Prob LR rho=0	0.000	0.000	0.000	0.000
EXPORT				
Log Distance	0.522115***	1.685588***	0.305507***	0.324416***
Developed Country Dummy	-0.79212***	0.452883***	-0.46422***	-0.49427***
Log Initial Trade Value	-0.12326***	0.884036***	-0.07207***	-0.07587***
Log Market Size (GDP partners)	-0.08633***	0.917293***	-0.05014***	-0.0524***
Log Supplier Size (GDP Indo)	-0.01835	0.98182	-0.00962	0.018243
Growth Credit Ratio	-0.00619***	0.993828***	-0.00375***	-0.00420**
Log Real Exchange Rate	-0.16944**	0.844134**	-0.09668**	-0.04415
Differentiated Product Dummy	-0.45037***	0.63739***	-0.26333***	-0.27595***
Constant	2.258984***	N/A	1.259395**	-0.44209
Observations	127,896	127,896	127,896	127,896
No. of spells	50,229	50,229	50,229	50,229
Trade relations	25,498	25,498	25,498	25,498
Log likelihood	**-184,480.94**	-184,480.94	184,805.16	-185,748.89
Prob LR coeff=0	0.000	0.000	0.000	0.000
ρ	0.29179	0.29179	0.318311	0.240415
Prob LR rho=0	0.000	0.000	0.000	0.000

Significant at ***) α = 1%; **) α = 5%;

ρ denotes the fraction of the error variance that is due to variation in the unobserved individual factors.

The number of observations is given by the total number of years with positive trade for all trade relationships.

Furthermore, the supplier size variable (partner's GDP) is included in Indonesian import as a proxy to control for supply capacity, while the market size variable (Indonesia's GDP) is included as a proxy for demand size. In contrast, in export we include the supplier size variable (Indonesia's GDP) as a proxy to control for supply capacity, while the market size variable (partner's GDP) is included as a proxy for demand size. We expect that higher supply capacity and higher demand size will lower the hazard. This supplier size hypothesis is supported by the results of import only while in export it is not significant. The supplier size has a significantly negative coefficient for import which would suggest that import trading relationships involving economically large supplier are less likely to die. At the same time, the market size is significant with the expected sign for import and export, which indicates that for Indonesian import (export), market size is an important factor to have a lower hazard rate of trade. The bigger the market size the longer the trade duration.

Our results are intuitive and consistent with many theoretical models. One might expect relationships involving homogeneous goods to be quite fragile. There are a number of explanations why differentiated products may exhibit long duration. Sunk costs and relationship specific investments can also explain differences in duration. If differentiated goods require larger initial investments, models such as that of Melitz (2003) suggest once relationships are established they will tend to be robust. In a series of papers Rauch uses network and search theory to explain why trade in differentiated products and homogeneous products is different (among others Rauch and Trindade, 2002). Fugazza and Molina (2009) suggest that the relationship between trade duration and the type of product portrays the degree of competition/information patterns characterizing traded products.

In addition, we include growth of credit ratio as a proxy of financial system development. Due to multicollinearity problem we replaced the log of credit ratio by growth of credit ratio. The hypothesis would be partners in countries with more developed financial systems tend to maintain their trade relationships longer. The results support this hypothesis: the coefficients are negative and significant for both import and export, which implies that trading (import/export) with more-developed-financial-system countries would have longer trade relationships.

We also include the log of the relative real exchange rate as a proxy of relative price changes, since exchange rate movements could explain exits from (and entry into) the market. A depreciating exchange rate would decrease the import yet it increases the export, such that it leads to a higher hazard rate for import and a lower hazard rate for export. This variable has a significant and positive coefficient for import, suggesting that a depreciation of the Indonesia currency (Rupiah) relative to the currencies of partners, as expected, increases the likelihood of import failure. On the other hand, for export this variable has a significant and negative coefficient, suggesting that a depreciation of the Rupiah relative to the currencies of partners, as expected, decreases the likelihood of stopping export.

5.2 Interpretation

Since the logit model offers the best fit for our data, both for import and export, i.e. the biggest log likelihood value, we will focus on this model when discussing the interpretation of the estimation results. The logit model, however, represents the relationship of covariates to the log odds of event. Therefore, in order to understand the impact of covariates to the probability of stopping trade, we use marginal changes for continuous variable and discrete changes for dummy variables.

Table 5. Marginal, Discrete and Factor Changes

	Variable	Marginal	0→1	Factor Change in Odds ratio
IMPORT	Log Distance	0.123	---	1.673
	Partner Dummy	N/A	-0.098	0.672
	Log Initial Trade Value	-0.025	---	0.902
	Log Market Size (GDP Indo)	-0.045	---	0.828
	Log Supplier Size (GDP partners)	-0.077	---	0.725
	Growth Credit Ratio	-0.001	---	0.994
	Log Real Exchange Rate	0.033	---	1.147
	Product Type Dummy	N/A	-0.089	0.695
EXPORT	Log Distance	0.104	---	1.686
	Partner Dummy	N/A	-0.181	0.453
	Log Initial Trade Value	-0.025	---	0.884
	Log Market Size (GDP partners)	-0.017	---	0.917
	Log Supplier Size (GDP Indo)	Not sig (-0.004)	---	0.982
	Growth Credit Ratio	-0.001	---	0.994
	Log Real Exchange Rate	-0.034	---	0.844
	Product Type Dummy	N/A	-0.098	0.637

Baseline: mean values, except partner dummy countries=0, product type dummy=0

The marginal change can be interpreted as for one unit increase in a variable from the baseline, the probability of an event, i.e. stopping import (export), is expected to increase/decrease by the magnitude of marginal change, holding all other variables constant. However, the marginal change is not applicable for dummy variable, instead we use discrete change. The interpretation of discrete change is for a change from one group to another group of a variable, the probability of an event is expected to change by the magnitude of discrete change, holding all other variables at the given values. While using odds ratio, for a one unit increase in an independent variable then the odds of stopping import (export) increases (if greater than one) or decreases (if less than one) by a factor of the magnitude of a change in the odds ratio, holding all other variables constant.

Finally based on the result, we can summarize a set of factors affecting the hazard rate of stopping import (and export). Those are distance, partner countries, initial trade value, market size, supplier size (only for import), growth of credit ratio, exchange rate and product type.

For Indonesian import, the farther the distance between Indonesia and trade partner, the higher the hazard rate of stopping import. Importing from developed countries (as trade partners) tends to have a long-lasting import relationship. The bigger the initial import values, the longer import duration. The Indonesian market size matters to have lower hazard rate of stopping import, that is the bigger the demand for import (the bigger the Indonesian market size) the lower the hazard rate. Importing from larger supplier has a higher survival rate. Moreover, Importing from partners that have a growing credit ratio tends to have longer import relationship. When Rupiah depreciates it is less likely to keep importing (shorter import duration). Lastly, importing differentiated product indicates longer import duration.

For export, the farther the distance between Indonesia and trade partner, the higher the hazard of stopping export. Exporting to developed countries (as trade partners) tends to have a long-lasting export relationship. The bigger the initial export values, the longer the export duration. Exporting to bigger market is very likely to have longer export duration. However, the Indonesian GDP (Indonesian supplier size) does not matter to have lower hazard rate of stopping export. Exporting to partners that have a growing credit ratio tend to have longer export relationship. In addition, when Rupiah depreciates it is more likely to keep exporting (longer export duration). Finally, exporting differentiated product indicates longer export duration.

5.3 Robustness

In this research the number of spells varies, starting from one-spell trades to six-spell trades with different proportions. Most of the trades are one- to two-spell trades which accounted for more than 81%, while less than 0.5% of trades are five- to six-spell trades. These different spell numbers between trades, however, may affect the estimation in the regression. Therefore, we check the robustness of the regression by doing weighted re-estimation, that is re-estimating the possible three models (logit, probit and cloglog) and taking into account the spell number as the weight to see whether the estimation results are sensitive to the weight. The detail results can be seen in Table 12 in the appendix.

The robustness results indicate that the import regression is stable. It is not sensitive to the number of spells. However, the supplier size and the exchange rate variables in the export regression are sensitive to the number of spells. In addition, the logit model offers the best fit to the data both import and export.

5.4 Plotting Predicted Probabilities of Stopping Trade

In order to identify which bilateral trade and what kind of product have lower hazard rate, we plot the predicted probabilities for these variables with other variables held at the base values.

The substantial gap between the two curves in Figure 2 (appendix) shows that trading with developed countries are more likely to lower hazard rate, although the difference is smaller when the log initial trade value is relatively small. Of course, initial trade values have negative effects on the probability of exiting the market (stopping trade). The same pattern also indicated in export. However, for export the difference of stopping export is getting bigger as the log of initial trade value increases. Similarly, trading differentiated products are more likely to have lower hazard rate for both import and export, although the difference is smaller when the distance is getting farther (see Figure 3 in appendix).

6. Conclusion and Policy Implications

1. To summarize the purely descriptive analysis, we find that Indonesian trades are short-lived; the median duration is merely 2 years for all spells, independent of whether one considers imports or exports. However, some certain products have a long-lasting relationship. These consist of essential imports such as wheat, and export goods in which Indonesia has a strong

comparative advantage (e.g. palm oil, rubber). Moreover, in many instances there is evidence of trade being frequently interrupted (‘stopped and re-started’).

2. Factors that have impacts on hazard rate of stopping import (and export) trade are distance, partner countries, initial trade value, market size, supplier size (for import only), growth of credit ratio, exchange rate and product type being traded.
3. The farther the distance, the higher the hazard of stopping import (export). Trading with developed countries (as trade partners) tends to have a long-lasting import (export) relationship. The bigger the initial trade values, the longer the trade duration. Trading (import/export) to bigger market is very likely to have longer trade (import/export) duration as demand gets bigger. Importing from larger supplier has a higher survival rate. Trading with partners that have a growing credit ratio tend to have longer trade relationship. In addition, when Rupiah is depreciating it is less likely to keep importing (shorter import duration), yet it is more likely to keep exporting (longer export duration). Finally, trading differentiated product indicates longer trade (import/export) duration.
4. For import, market size (Indonesia’s GDP) as well as supplier size (partner’s GDP) are important to have lower hazard rate of stopping import. These indicate that Indonesian import depends on both domestic and foreign situation. On the other hand, for export, market size (partner’s GDP) matters for longer export duration, yet supplier size (Indonesia’s GDP) does not matters which indicate that export depends more on foreign situation.
5. Trading with developed countries has a lower hazard rate compare to developing countries.
6. Trading differentiated product has a lower hazard rate compared to non differentiated product.

Some policy implications that can be drawn from this research are:

1. Many Indonesian exports, in terms of product-partner combination, are short lived. It is important to investigate further how Indonesian exports have been growing. The growth in export trade may be occurring more through increases volume of trade for existing trade partners (the intensive margin) rather than increases in trade in new products or to new partners (the extensive margin) (Besedes and Prusa, 2006a, 2006b). Also for the short

duration of import. Further study investigating the cause of short trade duration is needed. If it is found that constraint on financing is one of the issues then the government should support for better financial system. Among other benefits that could be gained, it will also help improve trade duration.

2. Any improvement in transportation which reduces transportation cost is very likely to strengthen trade links.
3. Indonesia and other developing countries do not trade as much as those with developed countries as they may produce similar products. However, the new trend of production network in Asian countries showed that Indonesia, and other ASEAN countries and China are part of the world production network. For instance, Indonesia produced "part & components" of differentiated goods. At the same time Indonesia traded "final goods" of the differentiated product to developed countries (Coxhead and Jayasuriya, 2010). Therefore, it implies for specialization as the consumer may not consider the source of the product.
4. Brenton, Pierola and Uexkull (2009) suggested that the associated high hazard rate for initially small flows suggests caution in public policy interventions that are aimed specifically at exporters that start small.
5. Selling products to bigger countries and buying from larger markets are likely to have longer trade relationships. Therefore, it is crucial to maintain trade relationships with them by committing to the trade contract, such as fulfill the product specification requirements.
6. It needs to be further investigating what kind of exchange rate policy that best suit to Indonesia according to its needs and trade objectives, always with the proviso that the chosen regime must be credibly supported by policies consistent with the choice. As noted by Michael Mussa, et.al (2000), that there is no single exchange rate regime that is best for all countries in all circumstances. Which exchange rate regime and associated policies are appropriate for a country depend on its particular circumstances.
7. As it is shown in discussion, type of product matters for survival, to be specific differentiated product has a lower hazard rate. Further study is needed to identify whether producing differentiated product produce good externalities. When such condition is proven, then government should support this economic sector activity.

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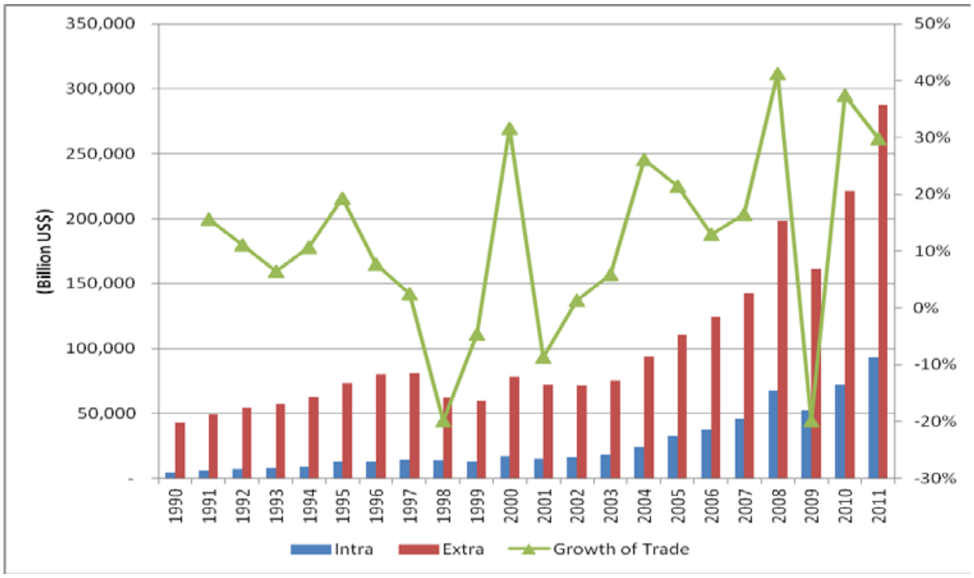
Appendices

Figure 1. Indonesian Trade, 1990-2011



Source: Directory of Trade, IMF

Table 6. Share of Indonesian Trade by Partners, 1990-2011

Partners	Value of (Millions US$)			Within Group		To the World	
	Export	Import	Total	Share	Cumulative Share	Share	Cumulative Share
Intra-ASEAN	*300,251.89*	*295,080.78*	*595,332.67*			*20.85%*	
Singapore	150,831.15	156,209.48	307,040.63	51.57%	51.57%	10.75%	10.75%
Malaysia	65,955.88	59,245.45	125,201.33	21.03%	72.61%	4.38%	15.14%
Thailand	37,853.56	53,223.42	91,076.98	15.30%	87.90%	3.19%	18.33%
Philippines	25,247.03	10,522.94	35,769.97	6.01%	93.91%	1.25%	19.58%
Vietnam	15,106.56	9,957.96	25,064.52	4.21%	98.12%	0.88%	
Myanmar	2,470.74	5,287.29	7,758.03	1.30%	99.43%	0.27%	
Cambodia	1,983.05	584.61	2,567.66	0.43%	99.86%	0.09%	
Brunei D.	757.98	37.79	795.76	0.13%	99.99%	0.03%	
Lao PDR	45.95	11.85	57.80	0.01%	100.00%	0.00%	
Non-ASEAN	*1,335,699.21*	*924,630.72*	*2,260,329.93*			*79.15%*	
Euro Area	166,139.67	113,613.68	279,753.35	12.38%	12.38%	9.80%	29.37%
Japan	349,988.83	170,092.76	520,081.59	23.01%	35.39%	18.21%	47.59%
United States	184,130.45	101,382.24	285,512.69	12.63%	48.02%	10.00%	57.59%
China, P.R.	118,591.79	121,579.92	240,171.71	10.63%	58.64%	8.41%	66.00%
Other countries	516,848.47	417,962.12	934,810.59	41.36%	100.00%	32.74%	
The World	1,635,951.10	1,219,711.50	2,855,662.60			100.00%	

Source: Directory of Trade, IMF

Table 7. Illustration of Data Structure for Regression (Product-Period Data)

id	episode	reporter code	trade flow code	partner code	commodity code	event	ldist	partner	linitial	lmarket	g_credit
21841	0	360	1	702	282734	1	6.786876	0	2.079442	27.05075	-0.0670014
21841	1	360	1	702	282734	1	6.786876	0	2.079442	27.08653	0.1691049
21841	2	360	1	702	282734	0	6.786876	0	2.079442	27.13054	-0.1306441
21841	3	360	1	702	282734	1	6.786876	0	2.079442	27.17724	0.0231399
21841	4	360	1	702	282734	0	6.786876	0	2.079442	27.22632	-0.0912315
21841	5	360	1	702	282734	0	6.786876	0	2.079442	27.28169	-0.0747721
21841	6	360	1	702	282734	0	6.786876	0	2.079442	27.33524	-0.0577309
21841	7	360	1	702	282734	1	6.786876	0	2.079442	27.39676	0.0116643
21841	8	360	1	702	282734	1	6.786876	0	2.079442	27.45516	0.1845522
21841	9	360	1	702	282734	1	6.786876	0	2.079442	27.5004	0.0294905
21841	10	360	1	702	282734	1	6.786876	0	2.079442	27.56051	-0.098435
21841	11	360	1	702	282734	1	6.786876	0	2.079442	27.62309	0.1112522
46967	0	360	2	392	847090	0	8.664168	1	8.96034	28.9299	-0.0343723
46967	1	360	2	392	847090	0	8.664168	1	8.96034	28.93344	0.0188258
46967	2	360	2	392	847090	1	8.664168	1	8.96034	28.93634	0.0463497
46967	3	360	2	392	847090	0	8.664168	1	8.96034	28.95305	0.0729005
46967	4	360	2	392	847090	1	8.664168	1	8.96034	28.97638	0.1304453
46967	5	360	2	392	847090	1	8.664168	1	8.96034	28.98932	0.0013368
46967	6	360	2	392	847090	0	8.664168	1	8.96034	29.00611	-0.0740395
46967	7	360	2	392	847090	0	8.664168	1	8.96034	29.0278	0.0333892
46967	8	360	2	392	847090	0	8.664168	1	8.96034	29.01732	0.0413313
46967	9	360	2	392	847090	1	8.664168	1	8.96034	28.96047	0.0399596
46967	10	360	2	392	847090	0	8.664168	1	8.96034	29.00386	0.0483756
46967	11	360	2	392	847090	0	8.664168	1	8.96034	28.99684	0.0837421

Table 8. Number of Spells by Type of Spell and Length of the spell

IMPORT

All Spells				Single-Spell				First-Spell			
length (year)	Freq.	Percent	Cum.	length (year)	Freq.	Percent	Cum.	length (year)	Freq.	Percent	Cum.
1	21,387	35.89	35.89	1	3,118	15.88	15.88	1	10,747	30.4	30.4
2	8,653	14.52	50.41	2	836	4.26	20.14	2	3,652	10.33	40.73
3	4,637	7.78	58.19	3	436	2.22	22.36	3	2,178	6.16	46.89
4	3,295	5.53	63.72	4	316	1.61	23.97	4	1,394	3.94	50.83
5	2,044	3.43	67.15	5	178	0.91	24.88	5	864	2.44	53.27
6	1,520	2.55	69.7	6	185	0.94	25.82	6	697	1.97	55.25
7	1,725	2.89	72.59	7	303	1.54	27.36	7	993	2.81	58.05
8	1,176	1.97	74.57	8	193	0.98	28.34	8	440	1.24	59.3
9	850	1.43	75.99	9	205	1.04	29.39	9	425	1.2	60.5
10	957	1.61	77.6	10	514	2.62	32.01	10	615	1.74	62.24
11	563	0.94	78.54	11	563	2.87	34.87	11	563	1.59	63.83
12	12,787	21.46	100	12	12,787	65.13	100	12	12,787	36.17	100
Total	59,594	100		Total	19,634	100		Total	35,355	100	

EXPORT

All Spells				Single-Spell				First-Spell			
length (year)	Freq.	Percent	Cum.	length (year)	Freq.	Percent	Cum.	length (year)	Freq.	Percent	Cum.
1	25,589	44.7	44.7	1	4,764	29.39	29.39	1	13,157	40.46	40.46
2	9,165	16.01	60.7	2	1,123	6.93	36.32	2	4,192	12.89	53.35
3	4,625	8.08	68.78	3	598	3.69	40.01	3	2,160	6.64	59.99
4	2,626	4.59	73.37	4	382	2.36	42.37	4	1,261	3.88	63.87
5	2,067	3.61	76.98	5	290	1.79	44.16	5	1,074	3.3	67.17
6	1,400	2.45	79.42	6	188	1.16	45.32	6	686	2.11	69.28
7	1,351	2.36	81.78	7	338	2.09	47.41	7	849	2.61	71.89
8	1,140	1.99	83.78	8	245	1.51	48.92	8	513	1.58	73.47
9	908	1.59	85.36	9	268	1.65	50.57	9	485	1.49	74.96
10	824	1.44	86.8	10	454	2.8	53.37	10	587	1.8	76.76
11	534	0.93	87.73	11	534	3.29	56.67	11	534	1.64	78.4
12	7,023	12.27	100	12	7,023	43.33	100	12	7,023	21.6	100
Total	57,252	100		Total	16,207	100		Total	32,521	100	

Table 9. Base Values and Descriptive Table for Variables

IMPORT

Variable	Base values	Obs	Mean	Std. Dev.	Min	Max
Event dummy	N/A	270816	0.519895	0.499605	0	1
Log Distance	8.162288	270816	8.162288	0.973885	6.786876	9.703274
Partner Dummy	0	270816	0.348857	0.47661	0	1
Log Initial Trade Value	8.147096	270816	8.147096	2.858804	0	19.22696
Log Market Size (GDP Indo)	27.31869	270816	27.31869	0.182608	27.05075	27.62309
Log Supplier Size (GDP partners)	27.58357	270816	27.58357	1.507278	25.74414	30.21414
Growth Credit Ratio	-0.0016474	270816	-0.16474	7.201402	-21.8556	18.47256
Log Real Exchange Rate	2.017725	270816	2.017725	1.696001	0	4.831413
Product Type Dummy	0	270816	0.544532	0.498014	0	1

EXPORT

Variable	Base values	Obs	Mean	Std. Dev.	Min	Max
Event dummy	N/A	305976	0.582006	0.49323	0	1
Log Distance	8.190065	305976	8.190065	0.958468	6.786876	9.703274
Partner Dummy	0	305976	0.35591	0.478789	0	1
Log Initial Trade Value	8.954987	305976	8.954987	2.773369	0	19.1643
Log Market Size (GDP partners)	27.66436	305976	27.66436	1.520705	25.74414	30.21414
Log Supplier Size (GDP Indo)	27.31869	305976	27.31869	0.182608	27.05075	27.62309
Growth Credit Ratio	0.0340203	305976	3.402035	5.113917	-7.40395	13.04453
Log Real Exchange Rate	9.134547	305976	9.134547	0.063144	9.038576	9.248593
Product Type Dummy	0	305976	0.595106	0.490872	0	1

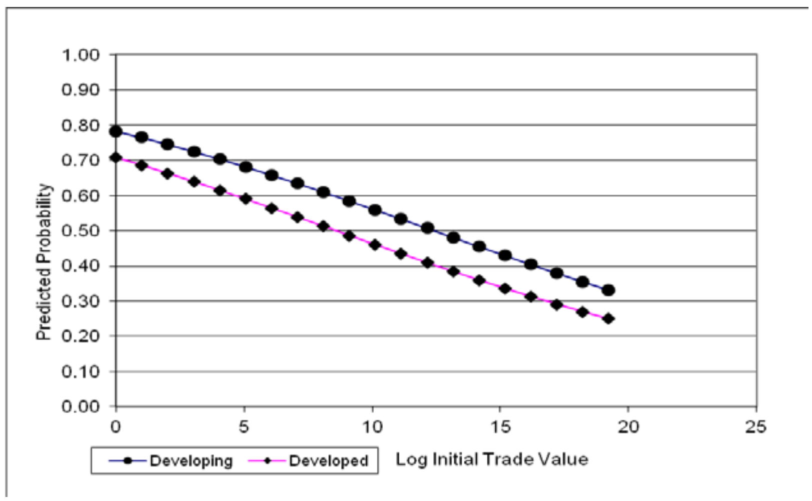
Table 10. List of Variables and Data Sources

Variable	Description	Source
Trade Flows	Exports and Imports: 6 digit of 1996 Harmonized System (HS) Code	United Nation Commodity Trade (UN Comtrade)
GDP	Gross Domestic Product, PPP (international $)	World Development Index (WDI), World Bank(WB)
Distance	Great-circle distance between capitals	Centre D'Etudes Prospectives Et D'Informations Internationale (CEPII)
Initial trade value	The value of trade in the first year of observation	UN Comtrade
Developed countries dummy	Dummy equal to 1 if countries are Japan, US, EU(27), 0 otherwise	ASEAN Statistics
CPI	Consumer Price Indexes	International Financial Statistics (IFS), IMF
Exchange Rate	Real Bilateral Exchange Rate	Own calculation using current exchange rate from WDI, WB;

Variable	Description	Source
		and CPI indexes from IFS, IMF
Growth of Domestic Credit	Domestic credit to private sector (% of GDP)	WDI, WB
Product classification	Dummy equal to 1 if the product is classified as differentiated according to Rauch (1999). Concordance is used to translate the Rauch classification from SITC (Rev. 2) to HS 1996	
Conversion from HS1996 to SITC Rev.2	http://unstats.un.org/unsd/trade/conversions/ HS%20Correlation%20and%20Conversion%20tables.htm	

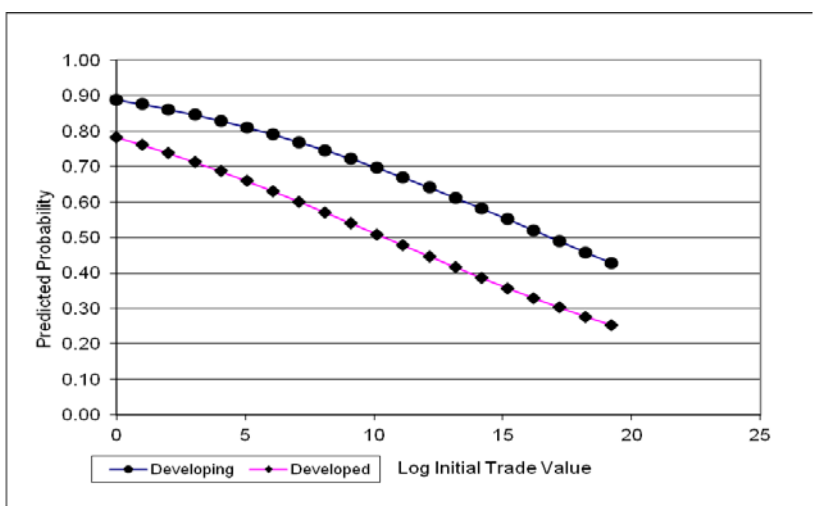
Figure 2. Predicted Probabilities of Stopping Trade by Initial Trade Value and Partners

IMPORT



Source: own plotting

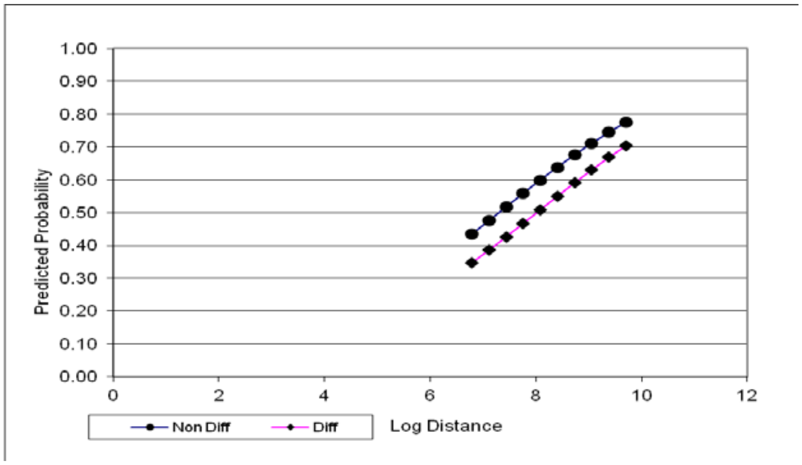
EXPORT



Source: own plotting

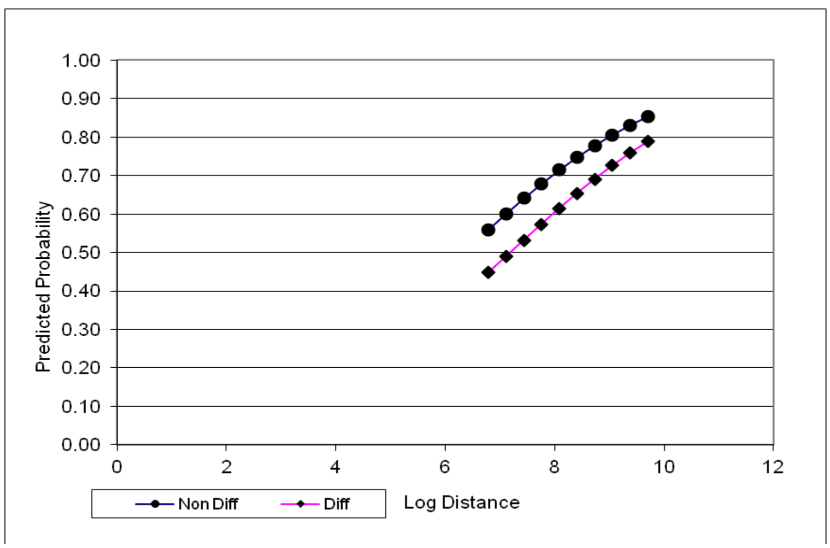
Figure 3. Predicted Probabilities of Stopping Trade by Distance and Product Type

IMPORT



Source: own plotting

EXPORT



Source: own plotting

Table 11. Number of Spells by Spell Serial Number and Length of the Spell

IMPORT

1st spell

Length	Freq.	Percent	Cum.
1	10,747	30.4	30.4
2	3,652	10.33	40.73
3	2,178	6.16	46.89
4	1,394	3.94	50.83
5	864	2.44	53.27
6	697	1.97	55.25
7	993	2.81	58.05
8	440	1.24	59.3
9	425	1.2	60.5
10	615	1.74	62.24
11	563	1.59	63.83
12	12,787	36.17	100
Total	35,355	100	

2nd spell

Length	Freq.	Percent	Cum.
1	6,567	41.77	41.77
2	3,054	19.43	61.2
3	1,548	9.85	71.05
4	1,152	7.33	78.37
5	767	4.88	83.25
6	598	3.8	87.06
7	595	3.78	90.84
8	673	4.28	95.12
9	425	2.7	97.82
10	342	2.18	100
Total	15,721	100	

3rd spell

Length	Freq.	Percent	Cum.
1	3,058	46.01	46.01
2	1,478	22.24	68.24
3	724	10.89	79.13
4	609	9.16	88.3
5	362	5.45	93.74
6	216	3.25	96.99
7	137	2.06	99.05
8	63	0.95	100
Total	6,647	100	

4th spell

Length	Freq.	Percent	Cum.
1	900	53.1	53.1
2	422	24.9	77.99
3	176	10.38	88.38
4	137	8.08	96.46
5	51	3.01	99.47
6	9	0.53	100
Total	1,695	100	

5th spell

Length	Freq.	Percent	Cum.
1	113	65.32	65.32
2	46	26.59	91.91
3	11	6.36	98.27
4	3	1.73	100
Total	173	100	

6th spell

Length	Freq.	Percent	Cum.
1	2	66.67	66.67
2	1	33.33	100
Total	3	100	

EXPORT

1st spell

Length	Freq.	Percent	Cum.
1	13,157	40.46	40.46
2	4,192	12.89	53.35
3	2,160	6.64	59.99
4	1,261	3.88	63.87
5	1,074	3.3	67.17
6	686	2.11	69.28
7	849	2.61	71.89
8	513	1.58	73.47
9	485	1.49	74.96
10	587	1.8	76.76
11	534	1.64	78.4
12	7,023	21.6	100
Total	32,521	100	

2nd spell

Length	Freq.	Percent	Cum.
1	7,736	47.42	47.42
2	3,138	19.24	66.65
3	1,590	9.75	76.4
4	928	5.69	82.09
5	706	4.33	86.42
6	550	3.37	89.79
7	438	2.68	92.47
8	568	3.48	95.95
9	423	2.59	98.55
10	237	1.45	100
Total	16,314	100	

3rd spell

Length	Freq.	Percent	Cum.
1	3,505	53.14	53.14
2	1,436	21.77	74.91
3	738	11.19	86.1
4	373	5.65	91.75
5	263	3.99	95.74
6	158	2.4	98.14
7	64	0.97	99.11
8	59	0.89	100
Total	6,596	100	

4th spell

Length	Freq.	Percent	Cum.
1	1,044	63.81	63.81
2	370	22.62	86.43
3	129	7.89	94.32
4	63	3.85	98.17
5	24	1.47	99.63
6	6	0.37	100
Total	1,636	100	

5th spell

Length	Freq.	Percent	Cum.
1	142	78.89	78.89
2	29	16.11	95
3	8	4.44	99.44
4	1	0.56	100
Total	180	100	

6th spell

Length	Freq.	Percent	Cum.
1	5	100	100
Total	5	100	

Table 12. Robustness: Regression with Weighting (Number of Spells)

Variables/Indicators	Model			
	Logit		Probit	Cloglog
	Log-odds	Odds Ratio		
IMPORT				
Log Distance	0.374256***	1.45391***	0.223363***	0.251763***
Developed Country Dummy	-0.31436***	0.730258***	-0.18691***	-0.21184***
Log Initial Trade Value	-0.08183***	0.921432***	-0.04879***	-0.05654***
Log Market Size (GDP Indo)	-0.34971***	0.704895***	-0.21248***	-0.21314***
Log Supplier Size (GDP partners)	-0.22526***	0.798307***	-0.13472***	-0.15261***
Growth Credit Ratio	-0.00176***	0.998244***	-0.00103***	-0.00137***
Log Real Exchange Rate	0.106415***	1.112283***	0.063727***	0.072103***
Differentiated Product Dummy	-0.27662***	0.758345***	-0.16544***	-0.18894***
Constant	13.36725***	N/A	8.087162***	7.995492***
Observations	130,020	130,020	130,020	130,020
No. of spells	46,807	46,807	46,807	46,807
Trade relations	22,568	22,568	22,568	22,568
Log likelihood	**-358636.27**	-358636.27	-358874.97	-359444.92
Prob LR coeff=0	0.000	0.000	0.000	0.000
ρ	0.22879	0.22879	0.258818	0.217302
Prob LR rho=0	0.000	0.000	0.000	0.000
EXPORT				
Log Distance	0.383574***	1.46752***	0.229285***	0.253756***
Developed Country Dummy	-0.6291***	0.533071***	-0.37628***	-0.4161***
Log Initial Trade Value	-0.09948***	0.905309***	-0.05942***	-0.06493***
Log Market Size (GDP partners)	-0.04562***	0.955403***	-0.02714***	-0.03022***
Log Supplier Size (GDP Indo)	-0.15259***	0.858484***	-0.0916***	-0.0758***
Growth Credit Ratio	-0.00409***	0.995921***	-0.00248***	-0.00303***
Log Real Exchange Rate	*0.344858****	*1.41179****	*0.210025****	*0.240828****
Differentiated Product Dummy	-0.34661***	0.707078***	-0.20711***	-0.22565***
Constant	0.683091	N/A	0.379639	-0.78418**
Observations	127,896	127,896	127,896	127,896
No. of spells	50,229	50,229	50,229	50,229
Trade relations	25,498	25,498	25,498	25,498
Log likelihood	**-384831.75**	-384831.75	-385098.15	-386066.03
Prob LR coeff=0	0.000	0.000	0.000	0.000
ρ	0.224298	0.224298	0.25392	0.197152
Prob LR ρ=0	0.000	0.000	0.000	0.000

Significant at ***) α = 1%; **) α = 5%;

ρ denotes the fraction of the error variance that is due to variation in the unobserved individual factors.

The number of observations is given by the total number of years with positive trade for all trade relationships.