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Abstract

Exploring the link between trade facilitation and the extensive and intensive margins of trade, the paper has two aims. The first and main objective is to investigate whether the extensive margin of trade in homogeneous and differentiated goods is affected in the same way by cross-border trade transaction costs. The second objective is to compare the implications for the extensive and intensive margins to ascertain the margin at which these transaction costs matter the most, again controlling for the type of goods being traded. Very detailed mirror data on imports to EU countries from developing countries in 2005 is utilized to decompose these countries' exports into its extensive and intensive margins. Using the number of days needed to export a good as a proxy for trade transaction costs, econometric evidence is found that there is a significant and negative association between export transaction costs and the extensive margin for differentiated goods: developing countries with high transaction costs will export significantly fewer differentiated goods. However, no such negative effect on the extensive margin is found for homogeneous goods. Comparing the two margins' effects, evidence is found that, for differentiated goods, the extensive margin is more negatively affected by export transaction costs than the intensive margin. Results also indicate that to the extent that there is an overall negative trade effect on homogeneous goods from export transaction costs, this negative effect stems from effects on the intensive margin.

JEL Classification: C21, F13, O24

Keywords: Trade Facilitation; Extensive and Intensive Margins of Trade; Export Diversification; Homogeneous and Differentiated Goods

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1 Introduction

Trade facilitation – the issue of cutting excessive amounts of red tape at the border – is seen by many as one of the most important current trade policy topics. It may be argued to be especially important in the North-South context, considering that many developing countries have particularly cumbersome cross-border trade procedures, and that their trade – which to a disproportionately large share takes place with developed countries – is often seen as falling short of its potential.

The existing trade facilitation literature – see below for a survey – has focused almost exclusively on the potential consequences for aggregate trade flows. Still, with the growing theoretical literature on heterogeneous firm trade theory, trade research has started to emphasize that trade barriers may have different implications for the extensive and intensive margins of trade (i.e. affecting the range of goods being traded as opposed to the volume of each traded good). Another issue that has received attention is that the trade of different types of goods may not behave in the same way. The trade facilitation literature contains some limited evidence concerning these matters: Dennis and Shepherd (2007) suggest that export costs at the border have an effect on the number of goods being exported, and Sadikov (2007), as well as Martínez-Zarzoso and Márquez-Ramos (2007) find evidence that trade facilitation would have a stronger impact on the aggregate sectoral trade flows of differentiated goods. However, we do not know whether the effects of trade facilitation on the extensive margin is the same for different types of goods, and in addition, there is (to the best of our knowledge) no research comparing trade facilitation's effects on the extensive and intensive margins. The contribution of this paper to the literature will be to investigate these two issues.

The justification for bringing these two perspectives together – i.e. the decomposition of trade into extensive and intensive margins, and allowing different types of goods – stems from both policy and theoretical considerations. In a recent extension to the heterogeneous firm trade literature, Chaney (2008) derives a model where the extensive and intensive margins' sensitivities to trade barriers depend on the elasticity of substitution, so the extensive margin of differentiated goods is e.g. predicted to be more sensitive to trade barriers than if goods were more homogeneous, while the opposite

holds for the intensive margin. This gives a theoretical justification for the importance of simultaneously taking into account both the decomposition of trade into its margins and the degree of differentiation of the traded goods.

This justification is further reinforced by policy considerations. From a macro policy perspective, one may argue that it is important to establish whether trade facilitation increases trade primarily through the extensive or the intensive margin. If trade grows at the extensive margin, this can be interpreted as export diversification, which in turn has been both theoretically and empirically linked with economic growth (for an overview of studies and a discussion of the theoretical links, see e.g. Herzer and Nowak-Lehnmann (2006) or Hesse (2007)). However, the type of goods that a country diversifies into is not irrelevant: if trade facilitation promotes exports of differentiated products rather than homogeneous goods, this would generally be seen as a desirable outcome in terms of the development process.

This paper pursues two lines of enquiry. First, we ask whether the extensive margin of trade in homogeneous and differentiated goods is affected in the same way by export transaction costs related to cumbersome cross-border trade procedures. Considering the interesting policy implications of export diversification, this is where the paper's main emphasis lies. Second, however, with the goal of comparing the implications for the extensive and intensive margins, we also look at the effects on the extensive margin in relation to the effects on the intensive margin to see where these trade transaction costs matter the most.

To answer these questions, very detailed data on imports to 25 EU countries from all developing countries in 2005 is used to decompose these countries' exports into the extensive and intensive margins. For the main question which focuses directly on the extensive margin, our empirical measure of this margin is the number of exported products. This measure, together with Rauch's (1999) classification of goods as homogeneous or differentiated, is used to estimate a model where the effects of trade transaction costs are allowed to differ for these two categories. Trade transaction costs related to cumbersome cross-border trade procedures are proxied by the number of days needed to export a good across the border, using data from the World Bank's (2007a) *Doing Business Database*. For the second question, the estimation strategy is similar, but

to get comparable measures of both the extensive and the intensive margins, we follow the methodology in Hummels and Klenow (2005), who derive explicit measures of both margins.

To summarize our results, we find a significant and negative association between export transaction costs and the extensive margin for differentiated goods: developing countries with high transaction costs will export significantly fewer differentiated goods. However, no such negative effect on the extensive margin is found for homogeneous goods. In other words, there is reason to believe that trade facilitation has the potential to increase the number of exported differentiated goods, while not necessarily the number of homogeneous goods. Comparing the two margins' effects, evidence is found that, for differentiated goods, the extensive margin is more negatively affected by export transaction costs than the intensive margin. Results are less robust concerning homogeneous goods, but results indicate that to the extent that there is an overall negative effect on homogeneous goods from export transaction costs, this negative effect stems from effects on the intensive margin.

2 Theoretical Framework

A natural theoretical setting for linking inefficient cross-border trade procedures to the extensive margin of trade is the emerging literature on heterogeneous firm trade theory, with Melitz (2003) being a seminal contribution. We will focus on one interesting extension to this model, Chaney (2008), which allows for many asymmetric countries separated by asymmetric trade barriers. Basically, it is a model of monopolistic competition, but unlike representative firm models such as Krugman (1980), firms are not identical, but differ in the level of productivity, and, in addition, there is a fixed cost of entering the export market.

Referring to Chaney (2008) for a more detailed description, the intuition behind the model is that firms vary by productivity, and because of the existence of fixed and variable costs of exporting, only more productive firms will find it profitable to export. The profitability of exports varies by destination, so it is more profitable to export to markets with, for example, high demand, low variable trade costs and lower fixed costs.

For every export destination *i*, there is a threshold level of productivity which yields zero profits from exports for firms in country *j*. All firms in *j* with a higher productivity than this will have positive profits from exporting to *i*. Therefore, only a subset of domestic firms will be exporters, but this subset varies with the characteristics of the foreign market.

Defining the intensive margin as exports per existing exporter and the extensive margin as the set of exporting firms, a reduction in *variable* trade costs will affect both margins positively, by making each existing exporter export more, and by increasing the number of exporters, since the threshold productivity level will drop. On the other hand, a reduction in *fixed* trade costs will not affect the intensive margin (the existing exporters have already paid this cost), but it will induce new firms to enter the export market. In other words, it will have a positive effect on the extensive margin. Chaney (2008) does not specifically refer to burdensome cross-border trade procedures, but, against the background of his model, these procedures may reasonably be seen as having elements of both fixed and variable costs. There are initial fixed or *sunk* costs of becoming an exporter in terms of learning the relevant procedures, but the firm will not be able to avoid all costs even in the long run. All else equal, it will take more time to comply with complicated and inefficient procedures, so the goods will remain at the border for a longer period than if the procedures are more efficient. This waiting will in turn constitute a cost for the firm, for example through depreciation of the goods' value, and this cost is variable.

Chaney (2008) shows in his model that the extensive and intensive margins' sensitivity to trade barriers are affected in opposite directions by the elasticity of substitution. A high elasticity of substitution (homogeneous goods) implies that the intensive margin is fairly sensitive to changes in trade barriers, while the extensive margin is not. As goods become more differentiated (i.e. as the elasticity of substitution decreases), the extensive margin will become more sensitive to trade barriers, whereas the intensive margin will become less sensitive. Thus, a theoretical prediction would be that the effects of trade transaction costs on the extensive margin will be larger in absolute terms for differentiated goods than for homogeneous goods. Further, comparing

the effects of trade transaction costs on the extensive and intensive margins, the difference can be expected to be larger for differentiated goods.

3 Trade Facilitation

Loosely speaking, trade facilitation is about making it easier for traders to move goods across borders. The Doha Ministerial Declaration (WTO 2001), formally refers to trade facilitation as "expediting the movement, release and clearance of goods, including goods in transit". It is often emphasized that a key to achieving this is to *simplify* and *harmonize* cross-border trade procedures and to increase *transparency*. Concretely, trade facilitation might include reforms such as reducing the number of official documents, signatures and stamps required for exports and imports; standardizing and simplifying required documentation; increasing the possibilities for electronic data submission; publishing all relevant laws, regulations etc about trade procedures and data requirements; creating a website where all relevant information can be found, implementing audit-based control and risk management and improving the communication between relevant government bodies (see Hellqvist 2003 for an excellent overview of the issue).

3.1 Previous Research

So far, the research that has been done to assess the trade effects of trade facilitation has focused on the implications for aggregate trade flows. All in the gravity tradition, but using various ways to define and measure trade facilitation and to estimate its results, Wilson *et al* (2003; 2005), Soloaga *et al* (2006), Djankov *et al* (2006), Nordås *et al* (2006), Persson (2008), Lee and Park (2007), and Iwanow and Kirkpatrick (2007) all tend to find significant effects on total trade.[1] However, so far, there is only a very limited

[1] For an overview: see Persson (2008). There is also a related CGE literature: OECD (2003), Francois *et al* (2005), Kinnman and Lodefalk (2007), Decreux and Fontagné (2006), Hertel and Keeney (2006) and Dennis (2006) are examples of papers that find substantial gains from trade facilitation. Further, the literature on trade facilitation is linked to the issue of Non-Tariff Barriers to Trade (NTBs), but the latter includes many more obstacles to trade. More generally, trade facilitation belongs to the literature on trade

amount of research that deals with the effects of trade facilitation on either the extensive and intensive margins or different types of goods.

Dennis and Shepherd (2007) use the number of 8-digit product lines for every two-digit sector exported from developing countries to the EU in 2005, as a measure of export diversification – this being seen as export growth at the extensive margin. Using data from the World Bank's *Doing Business Database*, they find that export costs, defined as the official fees levied on a 20-foot container leaving the exporting country, have a significantly negative effect on the number of product lines exported in every 2-digit sector.

Sadikov (2007) also makes use of the *Doing Business Database* to measure trade facilitation related border barriers: the number of signatures that an exporter has to collect from the authorities to export a good. Bilateral export volumes are then regressed on this as well as other gravity controls, while allowing homogeneous and differentiated goods to have different effects. Sadikov (2007) draws the conclusion that exports of differentiated products are more sensitive to changes in export signatures than those of homogeneous goods.

Martínez-Zarzoso and Márquez-Ramos (2007) study the effect of trade facilitation on sectoral non-zero trade volumes in 2000. Including variables from the *Doing Business Database* measuring the costs and time involved in exporting and importing, they conclude that export volumes of homogeneous and reference-priced goods are less time-sensitive than exports of differentiated goods.

3.2 Data and Sample

To measure the costs relevant for trade facilitation, we use the number of days needed to export or import a standardized good as a proxy. The data comes from the World Bank's (2007a) *Doing Business Database*. In the *Trading Across Borders* section of this large survey, local freight forwarders, shipping lines, customs brokers and port officials are

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costs – for an overview see Anderson and van Wincoop (2004) – and it is also related to the literature on trade and institutions.

asked about how much time, documents and costs would be involved for a hypothetical trading firm to export or import a well-defined, standardized good.[2]

Variables from the same database have been used in this context by e.g. Dennis and Shepherd (2007) (the costs of exporting), Sadikov (2007) (number of signatures) and Martínez-Zarzoso and Márquez-Ramos (2007) (costs and time of exporting and importing). We use several of these alternative measures as robustness checks, but would argue that the time variable is a good proxy for what we want to capture: in a broad sense the efficiency of cross-border trade procedures, i.e. the efficiency that reform, under the heading of trade facilitation, is meant to improve. The justification for this is that while specific problems giving rise to monetary costs generally will also imply longer waiting, longer waiting may arise for reasons that are not linked to any direct costs. For example, having to collect many signatures or fill out many documents might involve direct costs, but it will also increase the time needed to get the good through customs. The time measure should be strongly related to the degree of complexities involved in trading across the border, and therefore not only be a better proxy for the general effectiveness of cross-border trade procedures, but also potentially capture some of the fixed costs that arise due to these procedures.

Using *Generalized System of Preferences* (GSP) eligibility in 2005 as the definition of being a developing country, we have access to data for 130 developing countries concerning time needed for exports.[3] Table 1 shows some descriptive data for developing countries. The average time needed to export a good for all developing countries is 34 days, but it actually varies from as low as 9 days (in Panama) up to a

[2]The hypothetical trading firm that is a private limited liability company, fully domestically owned with a minimum of 100 employees, is located in the country's most populous city but does not operate within an export processing zone (EPZ) or an industrial estate with special export or import privileges, and exports more than 10 percent of its sales to international markets. The good is assumed to be non-hazardous, not to include any military arms or equipment, not to require refrigeration or any special environment, nor any special phytosanitary or environmental safety standards, and to be shipped in a dry-cargo, 20-foot, full container load. Trade is assumed to take place by ocean transportation through the closest or main port from the most populous city (the port may be located in another city or country). All procedures from the conclusion of a sales contract until the good leaves the port of exit are included. The database contains data on all documents required to export; the number of days needed, and the official fees levied on the container. For more specifics, see World Bank (2007a), or Djankov *et al* (2006).

[3] For a few countries, there is no data for 2005, but data is available for 2006 or 2007. When this is the case, we choose to use the latter data to get as full a sample as possible. This is reasonable, given that there is very little time-series variation in the data (which implies, also, that nothing is gained from adding more years to the sample).

maximum of 102 days (in Iraq). For a list of the included countries, as well as data sources and definitions for the other variables, see Tables 5 and 6 below.

Table 1. Days Needed for Exports among Developing Countries

	Mean	*Min*	*Max*	*Obs*
Low Income	43	20	82	51
Lower Middle Income	31	15	102	50
Upper Middle Income	22	9	36	24
High Income	17	13	28	5
Least Developed	40	20	78	47
All Developing Countries	34	9	102	130

Source: Author's calculations using data from the World Bank (2007a) *Doing Business Database*. Note that these figures only include developing country exporters (a few of which will be classified as "high income")

There are some problems with using this data as an indicator of potential trade facilitation. All goods do not necessarily react the same way to waiting at the border – in other words the level of variable and fixed costs might differ – and larger firms, especially those that export a lot, might further be much better equipped to deal with inefficient procedures, for instance by having specialized staff. One would also expect the time needed for export procedures to differ a lot for various destinations. Despite this, we only have one observation for every exporter, and this observation is supposed to measure the time it takes for a large company to export a relatively time-insensitive good. Therefore, the measure must necessarily be a crude one.

However, we would argue that the data can still be used as a reasonable indicator for the general condition of the customs environment. There is likely a high correlation between the time requirements for different kinds of goods and firms, so if border delays for the fairly large hypothetical trading firm's standardized good are large, this should mean that most other goods and firms also must wait for a long time at the border, even though the exact number of days varies.

4 Empirical Methodology

The empirical method is divided into two parts. First, very detailed mirror data on the imports to European Union countries from all developing countries in 2005 is used to decompose these countries' exports into the extensive and intensive margins. Incorporating a classification of products into homogeneous and differentiated following Rauch (1999), we then estimate a model including measures for export transaction costs focusing in turn on the extensive margin and the comparison between the two margins. To test the hypotheses outlined above, we allow separate effects from trade transaction costs on the different types of goods.

4.1 The Extensive and Intensive Margins of Trade

Over the last few years, the extensive and intensive margins of trade have received an increasing amount of attention in empirical research.[4] This is hardly surprising, given the theoretical developments that have taken place in the heterogeneous firm trade theory literature. Examples of papers that have used disaggregated trade data to measure the extensive (and sometimes intensive) margin include Dennis and Shepherd (2007), Flam and Nordström (2006), Cadot *et al* (2007), Brenton and Newfarmer (2007), Evenett and Venables (2002), Baldwin and Di Nino (2006), Amurgo-Pacheco and Piérola (2007), Debaere and Mostashari (2005), Baldwin and Harrigan (2007), Hummels and Klenow (2005), Funke and Ruhwedel (2001) and Kehoe and Ruhl (2003). Other authors have used aggregated trade data – Felbermayr and Kohler (2006; 2007) and Helpman *et al* (2008) – or firm level data: e.g. Bernard and Jensen (2004), Crozet and Koenig (2007), Bernard *et al* (2007) and Andersson (2007). Most, though not all, of these papers focus on the extensive margin, and, interestingly, irrespective of what kind of data or dependent

[4] The exact meaning of the terms *extensive margin* and *intensive margin* varies between contexts. In cross-sectional settings, the extensive margin is usually defined as the range of goods that is being exported or the number of exporting firms, while the intensive margin refers to how much is being exported of each good, or the exported volume for individual firms. When used in time-series contexts, growth at the extensive margin can refer to new goods being exported, old goods being exported to new destinations or a growing number of exporting firms. Growth at the intensive margin correspondingly refers to growing exports of goods that were already being exported or the volume of exports from incumbent exporters.

variable is being used, most papers use a set of explanatory variables that by and large can be said to belong to the gravity tradition. Details differ, but most papers will in some way control for economic size, distance and often some form of trade costs. Again, this is as expected, considering that the same kind of heterogeneous firm trade model that explains the emergence of the extensive and intensive margins of trade can also be used to derive gravity equations – see e.g. Chaney (2008) and Helpman *et al* (2008).

This paper follows, among others, Dennis and Shepherd (2007) and measures the extensive margin by counting the number of products that a country exports. This measure is simple and intuitive, and it corresponds well with the theoretical concepts. It would clearly be an advantage to use variations over time, but there is hardly any time-series data available on the effectiveness of cross-border trade procedures. Hence, to be able to say something about how these procedures affect the extensive (and intensive) margins of trade, it is necessary to exploit the cross-sectional variation between countries.

As the basis for counting the number of exported products, we use data from Eurostat (2007) for 2005 on imports to EU25 countries at the 8-digit (*Combined Nomenclature*) level from all developing countries (as defined above) with positive exports to at least one EU country. Using import data at the 8-digit level to 25 EU countries from 152 developing countries gives us 3,800 country-pairs and almost half a million observations with positive trade flows.[5] Since we want to be able to test the hypothesis that different types of goods are not affected in the same way by trade transaction costs, we count the number of exported products for both of two *sectors*: homogeneous and differentiated – see below. Thus, there are two observations on the extensive margin for every country-pair, yielding 7600 country-pair-sector observations in total.

It is important to be clear on how zeroes are to be treated. Eurostat only reports positive trade flows, but using this to deduce the potential trade flows that are zero, it turns out that about 44 percent of all (zero and non-zero) observations are such that there

[5] Up until the 6-digit level, the CN classification is the same as the *Harmonized System* (HS) classification. However, since the CN chapter 99 is not included in the HS classification, we have removed this chapter (this means disregarding 760 observations out of nearly half a million). Keeping only the goods that are classified by Rauch implies that an additional 35,430 observations are deleted. Note finally that there is only data on border procedures for 130 developing countries, so the estimation sample is somewhat smaller.

are no exports at all from the developing country in this particular sector. Obviously, these zeroes are very important to include in the investigation, since trade might be absent precisely because trade costs are too high.

Table 2. Developing Countries' Exports to the EU

	Bilateral Trade: Number of Products			**Unique Products**			**Number of EU Markets**		
	All Pairs	Non-Zero Pairs							
Country Group	*Mean*	*Mean*	*Max*	*Mean*	*Min*	*Max*	*Mean*	*Min*	*Max*
Low income	69	89	3962	506	25	6038	19	9	25
Lower Middle Income	192	232	5450	1194	12	7512	21	5	25
Upper Middle Income	131	175	2476	1076	7	5407	19	2	25
High Income	57	77	1663	653	48	3466	19	10	25
Least Developed	17	26	589	225	25	1186	17	6	25
All Developing	122	156	5450	871	7	7512	20	2	25

Source: Author's calculations using data from Eurostat (2007). Note that only developing countries' exports to the EU are included: due to the definition of a developing country (GSP eligible), this will include some high income countries. The first three columns show the number of 8-digit products that are exported per bilateral pair (first column shows the average using all potential bilateral pairs, i.e. also those having zero trade flows, while the second only uses bilateral pairs with strictly positive trade flows). "Unique products" refers to the number of products that a developing country exports to any EU country. The last three columns show figures for the number of EU markets the country exports to.

Table 2 suggests some interesting patterns regarding developing countries' trade with the EU. The mean number of 8-digit products exported in any given bilateral pair is surprisingly low for all income groups: the highest number is 232 products on average for lower middle income countries. However, looking at the maximum number of products that are exported bilaterally, there is also evidently a great deal of variation. For instance, China exports 5450 products to the United Kingdom, but, at the same time, there is actually no bilateral trade at all for quite a few pairs of countries.

Looking also at "unique products", i.e. the number of individual products that countries export to at least one EU country, the averages are a lot higher than the bilateral measures for all income groups. The average for all developing countries is 871 products, to be compared with 156 for any given bilateral pair. This suggests that while many countries have some exports to most EU countries (the average developing country exports to 20 EU markets), most of this trade will take place with only a few main trading partners, while the number of products exported to the rest will be much lower.

Counting the number of products being exported is our baseline method for measuring the extensive margin. However, since we are also interested in being able to

compare the extensive and intensive margins, we need an alternative method that can provide us with explicit and comparable measures of *both* margins. Therefore, as a second strategy we decompose trade following Hummels and Klenow (2005), who define the extensive margin on country *j*'s exports to country *i*, given a reference country *k*, as

$$(1) \qquad EM_{ij} = \frac{\sum_{g \in G_{ij}} p_{ikg} x_{ikg}}{\sum_{g \in G} p_{ikg} x_{ikg}}$$

where G_{ij} is the set of observable categories of goods *g* in which *j* has positive exports to *i*, *G* is the set of categories for which *k* has positive exports to *i*, and *p* and *x* stand for price and quantity respectively. Choosing the rest of the world as the reference country, the extensive margin is therefore basically defined as the share of country *i*'s imports from products that are exported by *j*. This may be seen as a weighted count of *j*'s categories relative to *k*'s categories, where the weights are the importance of a category in *k*'s exports to *i*.

The intensive margin for *j*'s exports to *i* is defined as

$$(2) \qquad IM_{ij} = \frac{\sum_{g \in G_{ij}} p_{ijg} x_{ijg}}{\sum_{g \in G_{ij}} p_{ikg} x_{ikg}}$$

so this is *j*'s nominal exports relative to *k*'s nominal exports in those categories in which *j* exports to *i*.

We define the reference country, *k*, to be all developing countries with positive exports to at least one EU country. For every country-pair, we further calculate *EM* and *IM* separately for homogeneous and differentiated goods. This way, it becomes possible

to separately estimate the effects of burdensome border procedures for the different types of goods.[6] [7]

4.2 Homogeneous and Differentiated Goods

The classification of goods into different types follows Rauch (1999). In this classification, Rauch distinguishes between two types of homogeneous goods – those that are traded on organized exchanges, and for which there are specialized traders that centralize price information, and those that are not, but for which nevertheless there are reference prices that are quoted in trade publications. We will refer both these types of goods as "homogeneous goods". All other goods for which there are no reference prices at all are classified as "differentiated". The classification is available on a 4-digit (SITC) level – see sources for all data below. Since there are ambiguities concerning how certain goods should be categorized, Rauch has two versions of the classification: a *conservative* classification that minimizes the number of commodities that are classified as homogeneous, and a *liberal* classification that maximizes this number. We use the conservative classification, but the results do not change by switching to the liberal one.[8]

Rauch's classification has been used in many contexts before. In the particular area of trade facilitation, Sadikov (2007) applies the liberal classification, while Martínez-Zarzoso and Márquez-Ramos (2007) use the conservative categorization.

As shown in Table 3, for all country groups, the majority of all exports is in differentiated goods. However, while homogeneous goods represent only about 21 percent of all goods that are exported, this trade corresponds to about 43 percent of the

[6] Feenstra and Kee (2007) use a similar strategy when looking at NAFTA's effects on the variety of Mexican exports to the US. They calculate separate measures of *EM* (which they call *export variety*) for each of seven broadly defined industries.

[7] As noted above, it is important to actually include the cases where no products are being exported. For the extensive margin, it is not really a problem – no exported product lines implies *EM* will simply be zero, but strictly speaking, the intensive margin is not defined in this case: summing over zero product lines means that the denominator in equation (2) will be zero. We choose to define the intensive margin as zero in these cases.

[8] In both the liberal and the conservative classification, the number of homogeneous goods is much smaller than the number of differentiated good, so we choose not make the former group even smaller by dividing it into two sub-categories.

value of exports: in other words, the bilateral flows of homogeneous goods tend to represent relatively large values.

Table 3. Developing Countries' Exports by Type of Product

	Homogeneous Goods			Differentiated Goods		
Country Group	*Average EM*	*Value Share*	*EM Share*	*Average EM*	*Value Share*	*EM Share*
Low income	21	0.46	0.25	79	0.54	0.75
Lower Middle Income	48	0.45	0.20	199	0.55	0.80
Upper Middle Income	46	0.42	0.20	145	0.58	0.80
High Income	12	0.28	0.11	72	0.72	0.89
Least Developed	6	0.42	0.23	23	0.58	0.77
All Developing	35	0.43	0.21	135	0.57	0.79

Note: Author's calculations using data on non-zero EU import flows from Eurostat (2007). For the types of products respectively, and for various country groups, figures show the average number of products (*EM*) being exported bilaterally, as well as the shares of the bilateral import value and numbers of products that can be attributed to the various types of goods.

4.3 Estimation

The main focus of the paper is the extensive margin. Since this is empirically measured by counting the number of exported products for every sector, i.e. the dependent variable takes the form of non-negative count data, using a linear model for $\mathrm{E}(EM \mid \mathbf{x})$ would be inappropriate – this could yield negative predicted values. Instead, a Poisson estimation strategy is used (see Wooldridge 2002).[9] It is assumed that

$$\mathrm{E}(EM \mid \mathbf{x}) = \exp(\mathbf{x}\beta).$$

where $\mathbf{x}$ is a $1 \times K$ vector of explanatory variables to be described below, and the vector β is $K \times 1$.

In the paper's second line of investigation, the aim is to compare the trade transaction costs' effects on the extensive and intensive margins. To be able to do this, we construct a new dependent variable, the extensive margin share (*EMS*). This is the

[9] Estimated using STATA's *poisson* command, with robust standard errors, clustered by country-pair.

extensive margin, divided by the sum of the extensive and intensive margins, $\frac{EM}{EM+IM}$, where the margins have been calculated using the methodology in Hummels and Klenow (2005).[10] Since the extensive margin share (as well as *EM* and *IM* individually) will only take values in the unit interval [0,1], estimation of a linear model for $\mathrm{E}(EMS|\mathbf{x})$ with OLS will suffer from the problem that the fitted values of *EMS* will not necessarily be restricted to the unit interval. Instead, we employ what Wooldridge (2002) refers to as a fractional logit regression. In this approach, following Papke and Wooldridge (1996), $\mathrm{E}(EMS|\mathbf{x})$ is modelled as a logistic function, so it is assumed that

$$\mathrm{E}(EMS|\mathbf{x}) = \exp(\mathbf{x}\beta)/[1+\exp(\mathbf{x}\beta)]$$

For more details, see Papke and Wooldridge (1996) and Wooldridge (2002). [11]

The next question is how to specify $\mathbf{x}\boldsymbol{\beta}$. Since there are no obvious reasons for doing otherwise, the same model is used to explain both the extensive margin and the extensive margin share. The choice of explanatory variables to include resembles that made in the rest of the literature on the extensive margin.

(Model I)

$$\begin{aligned}\mathbf{x}_{ijs}\beta = {} & \beta_1 + \beta_2 \ln(TF_j) + \beta_3 \ln(d_{ij}) + \beta_4 border_{ij} + \beta_5 lang_{ij} + \\ & \beta_6 colony_{ij} + \beta_7 landl_j + \beta_8 \ln(Y_j) + \beta_9 \ln(P_j) + \beta_{10} LDC_j + \\ & \beta_{11} \ln(1+tariff_{ij}) + \mu_i + region_j + diff_s\end{aligned}$$

The vector of variables explaining the extensive margin (or extensive margin share) of exports to importing EU country *i* from the exporting developing country *j* in sector *s* includes first and foremost the level of export transaction costs related to the efficiency of the cross-border trade procedures in the exporting country. This is labelled TF_j. We use

[10] It is possible for both margins to be zero. In this case, the extensive margin share is also set at zero.
[11] The methodology is implemented in STATA using the Generalized Linear Models framework. The command used is *glm* with *family(binomial)* and *link(logit)*, with robust standard errors that are clustered at the country-pair level.

the number of days needed to export a good across the border as a proxy for export transaction costs. Besides these costs related to cross-border trade procedures, the distance d_{ij} between the two countries' capitals is included as a proxy for variable transportation costs. Further, we include indicator variables for sharing a common border, $border_{ij}$, the same language, $lang_{ij}$, or a joint colonial history, $colony_{ij}$. These are variables that influence the ease with which new trading relationships can be created, so with reference to the theoretical model they primarily affect the level of fixed costs, and should mostly affect the extensive margin. We also control for whether the exporter is landlocked (*landl*), a geographical factor known to increase transportation costs. The model includes the exporting country's GDP (Y_j) and population (P_j) to control for supply capacity.[12] As a further control for the level of development and supply side conditions, there is a dummy (LDC_j) controlling for whether the exporter is a least developed country, and we lastly control for the average tariff country j exporters face when exporting to country i, $tariff_{ij}$.

Since the paper focuses on export activities, we have chosen not to include importer characteristics such as e.g. the level of trade transaction costs in the importing country. Instead, the model includes importer fixed effects, μ_i, that control for all observable and unobservable importer specific heterogeneity (including trade transaction costs, GDP etc). In a similar fashion, there are also regional exporter effects, $region_j$, to control for unobservable factors that affect all exporting companies within a geographical region in the same way.[13] Lastly, the model includes a dummy variable, $diff_s$, equal to one if the observation refers to the number of differentiated goods, and zero otherwise. Since the dependent variable is the number of exported products for homogeneous and

[12] Empirically, Imbs and Wacziarg (2003) have illustrated that diversification follows a U-shaped pattern, where countries first diversify when income per capita levels rise, but then at a later stage in the development process start to specialize again. Cadot *et al* (2007) find the same pattern concerning export diversification. Concerning this, note that the inclusion of GDP and population means that we are de facto controlling for income per capita.

[13] These regions include countries in near geographical proximity that have the same market access to the EU market, thus capturing any tariff effects that the average tariff cannot capture. Including country-specific exporter effects is appealing, but they would capture everything that only varies by exporter, i.e. one could not measure the effect of cumbersome cross-border procedures separately. See Table 6 in the Appendix for the division of countries into regions.

differentiated products, this is important because there are not equally many products to potentially export in these sectors.

The model above can be used to measure the average effect of trade transaction costs. However, the main innovation of the paper is to measure these effects separately for homogeneous and differentiated goods, so to be able to do this the model has to be augmented somewhat. Defining the vector **z** to consist of all explanatory variables except the ones measuring the trade transaction costs, the model becomes

$$\textit{(Model II)} \qquad \mathbf{x}_{ijs}\beta = \delta_1 homo_s * \ln\left(TF_{ij}\right) + \delta_2 diff_s * \ln\left(TF_{ij}\right) + \mathbf{z}\alpha \ .$$

So, the variable measuring export transaction costs is now interacted with dummies for homogeneous (*homo*) or differentiated (*diff*) goods, allowing these two types of goods to have separate parameters.

5 Empirical Results

5.1 Extensive margin

The results from a Poisson estimation of Models I and II are presented in Table 7 in the Appendix. In Model I, all observations are pooled together. The estimation shows that, all else equal, countries with high export transaction costs, i.e. countries with long border delays, will export significantly fewer products. The coefficient may be interpreted as an elasticity, so decreasing border delays by 1 percent will increase the number of exported products by about 0.25 percent. This corresponds well with the findings in Dennis and Shepherd (2007). These authors, while using a slightly different setup – for instance they use a different measure for trade transaction costs: the official costs of exporting[14] – find an elasticity of -0.32.

[14] They also use a different sample (for instance they use aggregate EU imports) and calculate the number of exported products per 2-digit sector.

In Model II, the specification has been made less restrictive by allowing homogeneous and differentiated goods to have different coefficients. This leads to some interesting results. Starting with differentiated goods, they have a negative and highly significant coefficient for trade transaction costs. Indeed, just as predicted in the theoretical model, this coefficient is also significantly *more* negative than the corresponding coefficient for homogeneous goods. So, countries with long border delays, will, all else equal, export significantly fewer differentiated products.

However, while we find the expected negative coefficient for differentiated goods, the coefficient for homogeneous goods is insignificant. In other words, in this data, we *cannot* find evidence of a significant negative effect from export transaction costs on the extensive margin of homogeneous goods. Thus, the overall negative effect on the extensive margin for developing countries from export transaction costs seems to stem from their effects on differentiated goods.

Lastly, it may be interesting to say a few words about the other explanatory variables. Distance, proxying for variable transport costs, has the expected negative and significant coefficient. Sharing a border, having the same language, or having a joint colonial history are all factors that have a significantly positive affect on the extensive margin. This is as expected, since these are factors that influence the ease with which new trading relationships are created. The coefficient for landlockedness is significant and negative, while the coefficients for GDP and population are significant and positive. The dummy controlling for whether the exporter is an LDC or not also has a significant and negative coefficient and, lastly, the EU tariff level has a positive and significant coefficient, which is not what one would expect.

5.2 Extensive versus Intensive Margin Effects

To be able to say something about the extensive margin results in relation to what happens at the intensive margin, we also estimate the same explanatory model for the extensive margin share – see results in Table 7 in the Appendix. When pooling all observations, export transaction costs have an insignificant coefficient. Thus, overall, we do not find evidence that export transaction costs would affect the extensive and intensive

margins in different ways: had this been the case, export transaction costs ought to make the extensive margin share either larger or smaller.

Results change, however, when different types of goods are allowed to have separate coefficients. Differentiated goods have a significantly negative coefficient. This can be interpreted as saying that, for differentiated goods, the extensive margin is more negatively affected by export transaction costs than the intensive margin is, since the extensive margin share, all else equal, will decrease when export transaction costs rise. To put it another way, the extensive margin effects dominate.

Homogeneous goods, on the other hand, have a significantly positive coefficient. The interpretation of this could then be that, for homogeneous goods, the intensive margin effects dominate. Remembering, however, that we did not find any negative effect on the extensive margin for homogeneous goods, a more accurate interpretation of the results is to say that to the extent that there is an overall negative effect on homogeneous goods from export transaction costs, this negative effect stems from effects on the intensive margin.[15]

5.3 Policy Simulations

From a policy perspective, the issue of the relationship between inefficient border procedures and the extensive margin boils down to the question: "How many more products would a country export if it were to engage in trade facilitation reform?". Given the sort of data that is available at present – cross-sectional data that only rather crudely proxies the efficiency of cross-border procedures, and that prevents the use of estimation methods where one could more properly control for unobserved heterogeneity across exporting countries – one should be very cautious when interpreting the estimation results as causal relationships. Therefore, using the estimated parameters to *simulate* what the

[15] We want to stress that the results concerning homogeneous goods, unlike those for differentiated goods, are not altogether robust, so one should be careful not to draw too strong conclusions regarding homogeneous goods. However, other authors have found negative effects from trade transaction costs on the aggregate trade of homogeneous goods, so our positive coefficient here, together with the lack of significant results on the extensive margin, do indeed seem to imply that the negative trade effects take place at the intensive margin.

effects would be of reducing border delays can at best only be seen as an illustrative exercise. However, it does offer an intuitive understanding of what the data and estimation results might actually be telling us, so remembering that the figures should not be taken too literally, a few reform scenarios will be considered.

We have considered three scenarios of trade facilitation. In all scenarios, the initial level of border delays is assumed to be the mean number of days needed for countries at various income levels. As a result of trade procedure reform, border delays are then assumed to decline by one day (*Scenario 1*), ten days (*Scenario 2*) or 50 percent (*Scenario 3*) from the initial level. Table 4 below show the expected percentage change in the extensive margin (i.e. the number of products being exported) as well as the change in the actual number of exported products. Since the regression results indicate that only differentiated goods would be affected, results only apply to this type of good.

Table 4. Policy Simulations: Trade Facilitation's Effects on Exports of Differentiated Products

	Scenario 1		Scenario 2		Scenario 3	
	1-day reduction from mean		10-days reduction from mean		Reduction by 50% from mean	
Country Group	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*
Low income	0.7	0.6	8	7	24	19
Lower Middle Income	1.0	2.1	13	26	24	48
Upper Middle Income	1.5	2.1	21	30	24	35
High Income	1.9	1.3	30	22	24	17
Least Developed	0.8	0.2	9	2	24	6
All Developing	0.9	1.3	12	16	24	33

Note: The scenarios represent a reduction of border delays by one day (*Scenario 1*), ten days (*Scenario 2*) or by 50 percent (*Scenario 3*), starting from the number of days needed on average in the country group to export a good. *Percent* is the percentage change in the number of exported goods, while *Number* is the actual change in the number of products.

Just reducing border delays by one day has modest effects for all country groups. However, looking at a more ambitious reform in scenario 2, the percentage changes in the number of exported products following a ten-day reduction of border delays are quite substantial. For developing countries in general, there would be a 12 percent increase in differentiated goods. Since low-income countries and LDCs start with much higher levels of border delays than the few high income developing country exporters, their percentage changes following a ten-day reduction are not as high. Still, 8 – 9 percent more export

goods in any given bilateral relationship is an interesting effect. Translated into actual export products, the effect of a ten-day reduction of border delays would be to increase the range of exported products by 7 – 30 products: again with the largest effects for high income countries.

Obviously, a ten-day reduction of export border delays corresponds to an ambitious reform in high income countries with low starting points, and a not so substantial reduction in the poorest countries where the initial situation is particularly bad. We therefore also consider a reform that would be ambitious for any developing country exporter: a reduction of border delays with 50 percent. Under this scenario, the average developing country would increase the export range by 33 (differentiated) products, but there is a lot of between-group variation: LDCs would only gain 6 products, while lower middle income exporters would gain an additional 48 products. One might wonder whether these simulated effects are economically significant. Well, in a sense they probably are: given that the average bilateral export relationship between a developing country and an EU25 country only involves 122 products (and this figure is as low as 17 for least developed countries!), these increases are arguably quite substantial.

5.4 Robustness

The results have been submitted to a number of robustness checks. First, as shown in Table 8 in the Appendix, we estimate the model using alternative estimation methods – Negative Binomial regression and OLS – and alternative proxies for trade transaction costs: the number of documents or costs needed to export a good. Reassuringly, the results for differentiated goods are very robust: regardless of estimation method or proxy, differentiated goods always have a negative and highly significant coefficient, and it is indeed always significantly more negative than the corresponding coefficient for homogeneous goods. The results for homogeneous goods are, however, somewhat sensitive. In most cases, the coefficient is insignificant, but there are three exceptions: using the cost variable as a proxy for transaction costs and estimating, these costs have a negative and significant coefficient (when estimating with a Poisson or Negative Binomial regression). Using the number of documents as a proxy and estimating with a

Negative Binomial regression, we actually get a positive and significant (at the ten percent level) coefficient. With these exceptions in mind, we are cautious to point out that the significant results for differentiated goods are much more robust, and the non-significant results concerning homogeneous goods should perhaps be seen as an interesting area for further research.

Second, to see whether the results apply only to certain types of countries, we allow different coefficients for low- and middle/high income exporters. Interestingly, pooling all observations, we find that, while both low- and middle/high income developing country exporters have negative coefficients for export transaction costs, the coefficient is significantly more negative for low income exporters. As found in Table 10, the same pattern arise for differentiated goods when we allow for separate effects. However, while low income exporters still have an insignificant coefficient for homogeneous goods, it is, surprisingly, positive and significant for middle/high income exporters.

Third, to see whether bilateral trade relationships that involve none or very few products influence the results, in three steps we exclude all observations where the number of exported products is zero or less than ten or less than 50. As shown in Table 10, the coefficient for differentiated products is remarkably stable, and always significantly negative. The coefficient for homogeneous goods is always insignificant.

Fourth and last, we also check whether adding more control variables can change the baseline results. Adding an index over how well corruption is perceived to be controlled – a factor clearly related to the subject of efficient cross-border trade procedures – does not alter the results. Following Dennis and Shepherd (2007) and adding a control for the cost of entering the domestic market likewise does not have any particular effect on the results. Lastly, to control for comparative advantage, we also include the share of agriculture in GDP. Again, we find the same pattern.[16]

[16] It should be mentioned that when we substitute our baseline measure of the extensive margin for the alternative one proposed by Hummels and Klenow (2005), we get the same significantly negative effect for differentiated goods, but we also get a significantly positive coefficient for homogeneous goods. Because of this, we want to stress the fact that the results for homogeneous goods are not as robust as those for differentiated goods. The result that differentiated goods always have a significantly *more* negative coefficient is, however, very robust.

So, to summarize, the result that differentiated goods have a significantly negative coefficient remain very robust regardless of how the extensive margin is measured, which estimation method is used or how trade transaction costs are proxied. Moreover, the result hold for countries belonging to different income categories, and it does not matter whether bilateral pairs trade only a few or many products. Additional control variables, while themselves significant, do not alter the results either. Homogeneous goods usually have an insignificant coefficient, though there are some exceptions, including two instances when it is significantly positive. The result that differentiated goods always have a significantly more negative coefficient is, however, very robust.

6 Summary and Conclusions

This paper explores the link between trade facilitation and the extensive margin of trade for different types of goods from two perspectives. First, it studies whether the extensive margins of trade in homogeneous and differentiated goods are affected in the same way by trade transaction costs related to cumbersome cross-border trade procedures. This is done by counting the number of 8-digit products that are exported from developing to EU countries, and then using this number as the dependent variable in an estimation where the number of days needed to export a good is a proxy for trade transaction costs, allowing separate effects for homogeneous and differentiated goods. We find that while countries with large export transaction costs, all else equal, will tend to export fewer goods altogether, there is no evidence of any negative effect for homogeneous goods. Instead, the overall negative effect appears to come from the negative effect on differentiated goods. Estimation results indicate that if export transaction costs would decline by 1 percent, the number of exported differentiated goods would rise by 0.3 percent. Translated into units that are perhaps more useful for policy considerations, a reduction of border delays by ten days would lead to an extra 16 exported differentiated products in any given bilateral trade relationship (this corresponds to an increase by 12 percent).

In a second line of investigation, the paper complements this study of the extensive margin by comparing the implications of the trade transaction costs for the

extensive and intensive margins. The same detailed import data is employed to construct comparable measures for both the extensive and intensive margins, which are then combined into one dependent variable called the extensive margin share (the extensive margin divided by the sum of the two margins). If we do not control for the type of traded goods, the extensive margin share appear not to be affected by export transaction costs, which would imply that the margins are affected in the same way. Controlling for whether trade is in homogeneous or differentiated products, however, we find that for differentiated goods, the extensive margin is more negatively affected by export transaction costs than the intensive margin is, since the extensive margin share, all else equal, will decrease when export transaction costs rise. For homogeneous goods, on the other hand, we draw the conclusion that to the extent that there is an overall negative trade effect on homogeneous goods from export transaction costs, this negative effect stems from effects on the intensive margin.

At this point, a few interesting observations can be made. First, in a general sense, the results we find support earlier studies: in line with Dennis and Shepherd (2007) we find a negative effect on the extensive margin from export transaction costs, and like Sadikov (2007) and Martínez-Zarzoso and Márquez-Ramos (2007), we also find that differentiated goods are more sensitive to these kinds of border barriers. By taking both the issue of the margins of trade and a classification of goods into different types into account, this study is, however, able to add some new insights. For example, the effects on the extensive margin is far from constant across different products: in fact, there seems to be no effect at all on certain types of goods. Also, while trade facilitation primarily may be expected to induce trade growth in differentiated goods by increasing the range of exported goods, i.e. growth at the extensive margin, any trade enhancing effects on homogeneous goods ought to be the results of increased trade volumes for old export goods, i.e. a growth at the intensive margin. In other words, combining these two perspectives makes it possible to better understand the mechanisms that are behind trade facilitation's effects.

Second, reassuringly, the results are consistent with the theoretical predictions in Chaney (2008): differentiated goods are more negatively affected by export transaction costs than homogeneous goods and the extensive margin share for differentiated goods

tends to get smaller when export transaction costs rise, while it correspondingly gets larger for homogeneous goods.

Third, from a methodological point of view, the fact that homogeneous and differentiated goods have estimated coefficients that are statistically different from each other implies that it is indeed very important to actually control for the type of good when investigating the effects of trade facilitation. Not doing this could bring about some very misleading results.

Fourth, while again emphasizing the dangers of drawing too strong conclusions from a purely cross-sectional study (and noting that the conclusions, strictly speaking, are only valid in a North-South context), there might be an interesting policy lesson here. Countries with inefficient and bureaucratic border procedures will run the risk of having no choice but to export a small range of products, most of them homogeneous. On the other hand countries engaging in reform could expect not only to get a more diversified export by increasing the total number of exported products, but also to have their export consist of differentiated goods to a larger extent, since these are the goods that are responsive to changes in border barriers. Both of these results would in many cases be seen as beneficial. This suggests that earlier discussions of the effects of trade facilitation – focusing almost exclusively on the implications for aggregate trade volumes – might have missed some of the more interesting potential outcomes.

One final observation is perhaps in order. Focusing on the extensive margin, this study has put a lot of emphasis on trade facilitation's potential effects on differentiated products. However, our results from comparing the margins also suggest that, while differentiated goods are predominantly affected at the extensive margin, homogeneous goods rather seem to be affected at the intensive margin. Thus, countries that do not consider themselves to have the necessary supply side conditions for successfully exporting differentiated goods could still have a valid reason for engaging in trade facilitation: they could increase the exported volumes of the homogeneous goods that they are already exporting.

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Appendix

Table 5. Variables and Data Sources

Imports	8-digit (Combined Nomenclature) imports from the Eurostat (2007) *Comext Database*.
Export Transaction Cost (TF)	Time needed to export a good across the border. Data from the World Bank (2007a) *Doing Business Database*.
Distance	Distance in kilometres between capital cities from CEPII (2006).
Border	Importer and exporter share a common border. From CEPII (2006).
Common Language	CEPII (2006).
Colony	Importer and exporter have been in a colonial relationship. From CEPII (2006).
Landlocked	CEPII (2006).
GDP	World Bank (2007b) *World Development Indicators* (WDI).
Population	World Bank (2007b) *World Development Indicators* (WDI).
LDC	Country is a least developed country.
Tariff	Average applied tariff, calculated using data at the HS2 level from the MAcMap Database, CEPII (2007). See also Bouët *et al* (2004).
Rauch Classification	Dummy variables indicating whether the good is classified as homogeneous or differentiated by Rauch (1999). Data on the Rauch Classification (revised July 2007), at the 4-digit (SITC Rev. 2) level from "John Haveman's International Trade Data" at http://www.macalester.edu/research/economics/page/haveman/trade.resources/tradedata.html. Concordances between SITC Rev.2 and Rev. 3 from Feenstra (1996). Concordances between SITC Rev. 3 and HS from the United Nations Statistics Division (2008).
Export Documents	Alternative measure of export transaction costs: The number of all documents needed to export a good across the border. Data from the World Bank (2007a) *Doing Business Database*.
Export Costs	Alternative measure of export transaction costs: The costs associated with all the procedures required to export a good across the border. Data from the World Bank (2007a) *Doing Business Database*.
Control of Corruption	Data from the Transparency International (2006) *Corruption Perceptions Index*.
Domestic Market Entry Cost	The official cost of registering a firm in percent of per capita income. Data from the World Bank (2007a) *Doing Business Database*.
Share of Agriculture in GDP	World Bank (2007b) *World Development Indicators* (WDI).

Note: All data are for 2005 unless otherwise stated.

Table 6. Sample of Exporters

Exporting Region	*Country*
West Africa	Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo
Central Africa	Cameroon, Central African Republic, Chad, Congo Dem. Rep., Congo Rep., Equatorial Guinea, Gabon, São Tomé and Principe
Eastern and Southern Africa	Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Uganda, Zambia, Zimbabwe
SADC	Angola, Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland, Tanzania
Caribbean	Antigua and Barbuda, Belize, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago
Pacific	Fiji, Kiribati, Marshall Islands, Micronesia, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu
South Asia	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
South-East Asia	Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Timor-Leste, Vietnam
Eastern Europe and Central Asia	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russian Federation, Tajikistan, Ukraine, Uzbekistan
Middle East	Iran, Iraq, Kuwait, Oman, Saudi Arabia, United Arab Emirates, Yemen
Mercosur	Argentina, Brazil, Paraguay, Uruguay
Mediterranean	Algeria, Egypt, Jordan, Lebanon, Morocco, Syrian Arab Republic, Tunisia
Drug	Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Peru, Venezuela
Other	China, Chile, Mexico, Mongolia

Note: All countries eligible (in 2005) for the EU *Generalized System of Preferences* (GSP) scheme, and for which there is data on export border procedures, are included as developing country exporters. All EU25 countries are included as importers. In general, every region is constructed so that all countries within the region have the same preferential access to the EU market (the exceptions being "other" and the fact that Pakistan, though eligible for preferences under the GSP special arrangements to combat drug production and trafficking ("Drug") is included in "South Asia" since it is reasonable to assume that it more closely resembles these countries concerning relevant supply side factors).

Table 7. Estimation Results

Model	*Model 1*	*Model II*	*Model I*	*Model II*
Dependent Variable	*No of Exports*	*No of Exports*	*EMS*	*EMS*
TF	-0.253***		0.025	
	[0.005]		[0.775]	
TF Homogeneous		0.019		0.453***
		[0.837]		[0.000]
TF Differentiated		-0.311***		-0.314***
		[0.001]		[0.001]
Distance	-1.036***	-1.036***	-0.327***	-0.350***
	[0.000]	[0.000]	[0.001]	[0.000]
Common Border	0.570**	0.570**	0.875***	0.832***
	[0.013]	[0.013]	[0.005]	[0.007]
Shared Language	0.251*	0.250*	0.404***	0.403***
	[0.066]	[0.066]	[0.000]	[0.000]
Colonial History	0.485***	0.485***	0.264*	0.275*
	[0.000]	[0.000]	[0.066]	[0.054]
Landlocked	-0.372***	-0.376***	0.025	0.038
	[0.000]	[0.000]	[0.744]	[0.621]
GDP	0.473***	0.473***	0.214***	0.213***
	[0.000]	[0.000]	[0.000]	[0.000]
Population	0.130***	0.131***	0.123***	0.129***
	[0.000]	[0.000]	[0.001]	[0.001]
LDC	-0.660***	-0.661***	-0.233***	-0.223***
	[0.000]	[0.000]	[0.007]	[0.010]
EU Tariff	3.150**	3.150**	-0.385	-0.145
	[0.013]	[0.013]	[0.749]	[0.905]
Constant	-0.019	-0.878	-5.555***	-6.888***
	[0.983]	[0.327]	[0.000]	[0.000]
No of Observations	6250	6250	6250	6250
Importer Effects	*Yes*	*Yes*	*Yes*	*Yes*
Regional Exporter Effects	*Yes*	*Yes*	*Yes*	*Yes*
Sector Effects	*Yes*	*Yes*	*Yes*	*Yes*

Note: Columns one and two show results from a Poisson estimation of Models I and II, with the number of exported 8-digit products per sector (i.e. type of good according to Rauch (1999)) being the dependent variable. Columns three and four show results from a fractional logit estimation of the same explanatory models, using the extensive margin share as the dependent variable. Robust p-values in brackets (standard errors have been clustered by country-pair). Asterisks denote significance at the 1% (***), 5% (**) and 10% (*) levels.

Table 8. Robustness: Trade Facilitation Proxy and Estimation Method

	Poisson			Negative Binomial			OLS		
	Time	*Documents*	*Cost*	*Time*	*Documents*	*Cost*	*Time*	*Documents*	*Cost*
TF Homogeneous	0.019	-0.149	-0.512***	-0.068	0.198*	-0.171***	-0.017	-0.012	-0.073
	[0.837]	[0.261]	[0.000]	[0.356]	[0.064]	[0.002]	[0.800]	[0.891]	[0.133]
TF Differentiated	-0.311***	-0.470***	-0.692***	-0.597***	-0.252***	-0.609***	-0.591***	-0.576***	-0.581***
	[0.001]	[0.000]	[0.000]	[0.000]	[0.008]	[0.000]	[0.000]	[0.000]	[0.000]
No of Observations	6250	6250	6250	6250	6250	6250	4356	4356	4356

Note: Partial results from Poisson, Negative Binomial and OLS estimations of Model II. The dependent variable is the number of exported 8-digit products per sector, except in the OLS estimations where the natural log of this variable is used. Three proxies for trade transaction costs are used: the time, number of documents and costs that are required to export a good across the border. Robust p-values in brackets (standard errors have been clustered by country-pair). Asterisks denote significance at the 1% (***), 5% (**) and 10% (*) levels. Complete results available on request.

Table 9. Robustness: Sample and Additional Control Variables

	Income Class.	*Products>0*	*Products≥10*	*Products≥50*	*Corruption*	*Market Entry*	*Agriculture*
TF Homogeneous		0.056	0.068	-0.066	-0.116	0.02	-0.059
		[0.552]	[0.494]	[0.579]	[0.218]	[0.833]	[0.556]
Low Income	0.058						
	[0.511]						
Middle/High Income	0.209**						
	[0.020]						
TF Differentiated		-0.314***	-0.323***	-0.314***	-0.451***	-0.312***	-0.419***
		[0.001]	[0.001]	[0.003]	[0.000]	[0.001]	[0.000]
Low Income	-0.347***						
	[0.000]						
Middle/High Income	-0.256***						
	[0.007]						
Control of Corruption					1.098***		
					[0.000]		
Market Entry Cost						-0.055**	
						[0.027]	
Share of Agriculture in GDP							0.112**
							[0.046]
Constant	-0.786	-0.897	-0.786	0.171	-1.522*	-0.778	-2.757**
	[0.382]	[0.309]	[0.361]	[0.843]	[0.074]	[0.401]	[0.029]
No of Observations	6250	4356	2321	1141	5050	6250	5150

Note: Partial results from Poisson estimations of Model II, with the number of exported 8-digit products per sector (i.e. type of good according to Rauch (1999)) being the dependent variable. Robust p-values in brackets (standard errors have been clustered by country-pair). Asterisks denote significance at the 1% (***), 5% (**) and 10% (*) levels. Complete results available on request.