EFFECTS OF TRADE FACILITATION ON SECTORAL TRADE

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ABSTRACT

This paper focuses on the analysis of the relationship between trade facilitation, transport costs and sectoral trade in developing countries. A gravity model is estimated using sectoral exports from 181 countries over the period 2004-2013. The model is augmented with maritime transport infrastructure and trade facilitation variables. In particular, the logistic performance index and time delays and number of bureaucratic procedures are used to proxy for maritime transport infrastructure and trade facilitation variables, respectively. The main findings show that time delays significantly decrease trade flows and that both, maritime infrastructure and institutional trade barriers (trade facilitation factors), are important factors influencing sectoral trade.

KEYWORDS: Trade facilitation; Sectoral trade; Developing countries, Aid for trade

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1. INTRODUCTION

The world economy has experienced continued economic growth over the last decade which has also been reflected in the significant increase in international trade in terms of volume, value and also diversification of traded products. Maritime transport has been one of the principal carrier and facilitator of this growth. While significant advances have been made in port infrastructure development to satisfy this continued increase in transportation demand, a growing mismatch between infrastructure provision and transportation demand growth can still be observed. Additionally, recent institutional trade barriers among trading partners, such as excessive time delays and bureaucratic requirements for different goods traded, indicate the need of empirical research to provide some insights on the effect that trade facilitation could play in fostering trade in particular in developing countries.[1]

Consequently, the question that arises is how these trade facilitation factors have evolved over time and in how far repercussions from maritime transport infrastructure development and trade facilitation might be reflected in the structure of bilateral trade.

Whereas a number of studies have analysed the effects of transport infrastructure on transport costs and trade in developed and developing countries (Limao and Venables, 2001; Márquez-Ramos et al, 2010), only a few studies have focused on trade facilitation issues (Persson, 2007; Martínez-Zarzoso and Márquez-Ramos, 2008) and, to our knowledge, none of them has analysed the effect some trade facilitation aspects, namely logistic performance and aid for trade on sectoral trade in developing countries. Therefore, this paper aims to cover this gap by analysing the relationship between trade facilitation and sectoral exports in developing countries.

[1] See for example the case "Brasil informará hoy si acepta las condiciones argentinas para negociar" ("Brazil will announce today whether it accepts Argentina's conditions for negotiations" in English), Page 12, 16th May 2011. http://www.pagina12.com.ar/diario/economia/2-168230-2011-05-16.html

Our methodology is based on the estimation of a gravity equation of trade using up-to-date panel data techniques that allow controlling for country and sectoral unobserved heterogeneity.

Our findings show that trade facilitation variables, namely aid for trade, logistic performance, time to trade and number of documents needed to trade have a direct influence on trade. Furthermore, trade facilitation variables have heterogeneous effects on sectors. For instance, logistic performance appears to be highly important for exports of machinery products. Time to trade impedes exports of raw materials and other manufacturing products such as textiles, etc. Number of documents for exports reduces exports of agricultural products and other machinery products.

The paper is organized as follows. A review of the literature on trade facilitation is provided in Section 2. Section 3 presents the data and variables used. Section 4 outlines the model specification and the empirical approach. Section 5 details the main results. Finally, Section 6 offers some concluding remarks.

2. LITERATURE REVIEW

In relation to the definition of trade facilitation, Wilson, Mann and Otsuki (2003, 2005) considered a broad definition of trade facilitation, and quantified the impact of four different measures (port efficiency, customs environment, regulatory environment and e-business usage). As an alternative, Engman (2005) used the WTO definition of trade facilitation (the simplification and harmonisation of international trade procedures) by paying attention only to what happens around the border. Other authors[2] focused, instead, on the effects of single measures of trade facilitation (information technology, port efficiency, institutions' quality).

[2] See Wilson, Mann and Otsuki (2003, 2005) for a more detailed review of earlier work on single measures of trade facilitation.

Concerning the empirics, two main modelling approaches have been used. First, several investigations use the gravity model of trade augmented with "trade facilitation" variables. In this line, Wilson, Mann and Otsuki (2003, 2005) estimated a gravity model of trade augmented with the above-mentioned trade-facilitation variables for a group of countries in the Asia-Pacific region and for a sample of 75 countries. In addition, Soloaga, Wilson and Mejía (2006) used a similar methodology and data, but focused on Mexican competitiveness. In a more general setting, Djankov, Freund and Pham (2006) used the World Bank's Doing Business Database, as we do in this paper, but focused only on the effects of time delays in the exporting country whereas Nordas, Pinali and Grosso (2006) centred on how time delays affect the probability to export and the export volumes for imports from Japan, Australia and the United Kingdom. Persson (2007) studied the effect of time delays and transaction costs on trade flows using a sample selection approach and focussing on the specific effects for each of the six groups of ACP countries negotiating Economic Partnership agreements with the EU. Finally, Martínez-Zarzoso and Márquez-Ramos (2008) analyse the effect of trade facilitation on trade volumes at a disaggregated level. They focus on the simplification of "at the border procedures", which includes the number of documents and amount of time involved in border crossings, as well as the transaction costs incurred. Their results support multilateral initiatives that encourage countries to assess and improve their trade facilitation needs and priorities.

Second, several institutions and authors (UNCTAD, 2001; OECD, 2003; Dennis, 2006; Decreux and Fontagne, 2006) used a computable general equilibrium model to estimate the effect of a composite index of trade facilitation on trade flows. In general, the results obtained from both approaches reveal significant and positive effects on trade flows.

To our knowledge, only recently Márquez-Ramos, Martínez-Zarzoso and Suárez-Burguet (2011) compare different types of trade barriers in both developed and developing countries, thus being

trade facilitation variables and policy trade barriers, as tariff peaks and tariff escalation remain important issues for developing countries, and a "tariff bias" exists against developing countries (Márquez-Ramos et al, 2011). These authors show that trade facilitation variables are, in relative terms, more important than tariffs. Therefore, increasing trade facilitation would lead to an increase in world trade, although this increase would not be the same in all countries as, by running simulations, Márquez-Ramos et al (2011) show that the magnitude of the effect of improving trade facilitation depends on country size. However, Márquez-Ramos et al (2011) focus on exports and their single-exporter regressions indicate that their model and data perform better for developed than for developing exporters. Additionally, they do not focus on specific developing regions and do not consider an accurate bilateral freight rate measure, and then they do not analyse the role that trade facilitation procedures might play on transport costs. The present paper mainly differs from existing trade-facilitation literature in that it focus on imports and analyses the effect of trade facilitation on sectoral trade with a special focus on developing countries.

3. DATA

This section describes the variables used in the empirical model and the main sources.

The dependent variable in the gravity model is exports between the country of origin and the country of destination. This variable expresses the amount in current dollars that importers have to pay for the products at free on board (fob) prices. Bilateral trade data from 1973 to 2013 for aggregated and disaggregated exports (1 digit level SITC) is from UN-COMTRADE. The products included in the sectors considered in the empirical analysis are listed in Table A.2 in the Appendix. The list of countries for which data on all variables are available is shown in Table A.3.

Data on income and population variables are drawn from the World Bank (World Development Indicators Database, 2017). Distances between capitals computed as great-circle distances using data on straight-line distances in kilometres, latitudes and longitudes, trade impeding or promoting factors such as being a former colony and sharing a common language or a common border are taken from the CEPII data base[3]. RTA and WTO dummies are from De Souza (2012). The official LDC list and the characteristics of LDC countries are from the UNDP.

Concerning the trade facilitation variables, the Logistic Performance Index (LPI) is from UNCTAD statistics.

Number of days (documents) to import and export and over-land transport cost to import and export are from the World Bank's Doing Business (2017) database (see Márquez-Ramos et al 2011, for a detailed description). The expected sign for these variables is negative, since more days (documents) needed to import or exports could be associated with lower exports. The same applies to over-land transport costs.

An additional proxy for trade facilitation is aid for trade from the OECD Trade Facilitation statistics and reports the monetary value of the disbursements of official development aid dedicated to trade facilitation.

Table 1 shows the summary statistics for the variables in natural logarithms and the summary statistic for the trade facilitation variables in levels is given in Table A.4

4. MODEL SPECIFICATION

According to the underlying theory that has been reformulated and extended by Anderson and Van Wincoop (2003), our model assumes a constant elasticity of substitution and product differentiation by place of origin. In addition, prices differ among locations due to symmetric bilateral trade costs. The reduced form of the model is specified as:

[3] http://www.cepii.fr/anglaisgraph/bdd/fdi.html.

$$X_{ijt} = \frac{Y_{it} Y_{jt}}{Y_t^W} \left(\frac{t_{ijt}}{P_{it} P_{jt}} \right)^{1-\sigma} \quad (1)$$

where X_{ijt} are the bilateral exports from country i to country j in year t, and Y_{it} , Y_{jt} and Y^W are the GDP of the exporting country, the importing country and the world in year t, respectively. t_{ijt} denotes trade costs between the exporter and the importer in year t, and P_{it} and P_{jt} are the so-called MRF. σ is the elasticity of substitution between all goods.

The empirical specification in log-linear form is given by:

$$\ln M_{ijt} = ln\, Y_{it} + ln\, Y_{jt} - ln\, Y_t^W + (1-\sigma) ln\, t_{ijt} - (1-\sigma) ln\, P_{it} - (1-\sigma) ln\, P_{jt} \quad (2)$$

The estimation of equation (2) is not straightforward due to the presence of trade costs and MRF. In the gravity literature, the trade cost function $t_{ijt,}$ is assumed to be a linear function of a number of trade barriers, namely, the time-invariant determinants of trade flows, including distance, common border, common colonial past and common language dummies, and the time-varying policy variables (membership in multilateral agreements such as RTAs, currency unions, World Trade Organization and trade facilitation variables). It takes the form:

$$t_{ijt} = d_{ij}^{\alpha_3} TF_{it}^{\alpha_4} TF_{jt}^{\alpha_5} LPI_{ijt}^{\alpha_6} \exp(\alpha_7 Contig_{ij} + \alpha_8 Comlang_{ij} + \alpha_9 Comcol_{ij} + \alpha_{10} RTA_{ijt} + \alpha 11 WTOijt + \alpha 12 Comcurijt) \quad (3)$$

Substitution of the trade cost function (3) into equation (2) and adding time dummy variables and an idiosyncratic error term gives the following estimation:

$$\ln(X_{ijkt}) = \gamma_i + \delta_j + \alpha_1 \ln Y_{it} + \alpha_2 \ln Y_{jt} + \alpha_3 \ln Pop_{it} + \alpha_4 \ln Pop_{jt} + \alpha_5 \ln Dist_{ij} + \alpha_6 TF_{it} + \alpha 7 TFjt + \alpha 8 LPIijt + \alpha 9 Contigij + \alpha 10 Comlangij + \alpha 11 Comcolij + \alpha 12 RTAijt + \alpha 13 WTOijt + \alpha 14 Comcurijt + \theta t + uijkt \quad (4)$$

here X_{ijkt} denotes exports of shipped from country *i* to country j in year *t*; ln $Dist_{ij}$ denotes geographical distance between country *i* and country *j* in logs; $Comlang_{ij}$ and $Comcol_{ij}$ take the

value of one when countries *i* and *j* share an official language or have ever had a colonial relationship, respectively, and zero otherwise; $Contig_{ij}$ takes the value of one when the trading countries share a border, zero otherwise; RTA_{ijt} takes the value of one when the trading countries are members of a regional trade agreement, zero otherwise; WTO_{ijt} takes the value of one if country *i* or country *j* are WTO members and two if both are members; and $Comcur_{ijt}$ takes the value of one when countries *i* and *j* belong to the same currency union. LPI_{ijt} is the Logistic Performance Index, γ_t denotes a set of year dummies that proxy for business cycle and other time-variant common factors (globalization) that affect all trade flows in the same manner.

In line with recent gravity literature, the price terms ($ln\ P_{it}$, $ln\ P_{ij}$) MRF are modelled as time-invariant country-specific dummies, given the short time span of our sample (due to data availability of the target variables related to trade facilitation). Finally, in an additional specification, rather than adding the usual time-invariant gravity variables to control for differences in trade costs (distance, etc.), we use country pair fixed effects γ_{ijk} to control for bilateral unobserved characteristics. The equation is given by:

$$\ln(X_{ijkt}) = \gamma_{ij} + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln Pop_{it} + \beta_4 \ln Pop_{jt} + \beta_5 TF_{it} + \alpha_6 TF_{jt} + \beta_7 FTA_{ijt} + \beta 8WTOijt + \beta 9Comcurijt + \beta 10lnLPIijt + \theta t + uijkt \quad (5)$$

Our estimation strategy follows Baier and Bergstrand (2007) and Head and Mayer (2014) by using country pair fixed effects to control for endogeneity of the LPI, as well as time dummy variables to control for common time trends (already introduced in equation (4) and kept in (5)). In this way, the gravity models that we estimate in this paper control for the possibility of endogeneity present in the trade facilitation variables, which could arise if countries self-select themselves into both the improvement of logistic infrastructures and trade facilitation, depending on their volume of trade. In summary, in the most comprehensive specification, given by equation (5), we exploit the panel nature of the data and include two sets of fixed effects (dummy

variables) that account for common time-varying unobserved factors, and across the country pair dimension (country pair- or "dyadic"- fixed effects). For comparison, we present the traditional gravity model estimations with economic and bilateral variables and product fixed effects (instead of dyadic fixed effects) and with common time effects.

As part of the TF variables we include total aid for trade (AfT) delivered by country i and received by country j. Since there are some countries only receiving or only giving AfT, we have introduced this variable in the gravity equation using the methodology originally proposed by Wagner (2003) to account for zero AfT flows.

This methodology avoids the loss of the observations with zero aid by augmenting the model with non-aid dummies and allowing the handling of cases where AfT is zero by replacing $ln\ (AfT_{i,t-2})$ with $ln(max[1,\ AfT_{i,t-2}])$. It has been also used by Cali and te Velde (2011) and also applied in Martinez-Zarzoso et al (2017).

Having defined the basic structure of the estimating equations, we now turn to the main results.

5. MAIN RESULTS

Table 2 and Table 3 show the obtained results for bilateral trade equations, for aggregate and disaggregated trade, respectively. Columns (1) and (2) in Table 2 present results of estimating equations (4) and (5) with aggregated data and without lags in the target variables, whereas Columns (3) and (4) present results of estimating equations (4) and (5) using lagged values of aid for trade (2 lags) and 1 lag of doing business variables.

In relation to the target variables, results in columns (2) and (3) show that a better logistic performance is positively correlated with exports. However when we control for bilateral unobserved heterogeneity the effect is largely reduced in size and only statistically significant at the 10 percent level (column (2)).

Both the number of days and documents required to trade are in general negatively correlated to exports. In particular, a 10 percent decrease in the number of days needed to exports increases exports by almost 3.8 percent, according to results in column (1). The cost to move a container from the port to the final destination has also a significant influence on exports, according to the results in all columns. However, the number of documents needed is in general not statistically significant or shows even a positive correlation with exports in column (2). The corresponding trade facilitation variables for the importer country show in general no significant effects.

Columns (3) and (4) in Table (2) show the results when the target variables are introduced with lags to avoid endogeneity issues. The main change in results corresponds to the aid for trade variable, which turns out to show a positive and significant effect in column (4) when bilateral time-invariant heterogeneity is controlled for. We use a specification with AfT lagged two periods and the rest of TF variables lagged one period. We follow the AfT literature in this respect (Cali and Te Velde, 2011). Table 3 shows the results for the trade equation estimated with disaggregated data. The gravity model specification corresponds to model (5) and is the same

baseline specification used for total exports in column (4) of Table 2. The columns present results for different sectors at the 1-digit disaggregation level, following the classification shown in Table A.2 in the Appendix. Displayed findings vary a lot. Therefore, further estimations are needed. Nonetheless, they show that a better logistic performance is positively correlated with exports of machinery and transport equipment exports. Number of days to exports affect negatively the exports of raw materials and exports of textiles, apparel and clothing, leather, footwear, travel goods, etc. Number of documents for exports has a negative and significant impact on exports of agricultural and chemical products whereas the number of documents for imports impedes the exports of machinery and transport equipment. The cost to move a container from the port to the final destination has a significant negative influence on exports of textiles, apparel and clothing, leather, footwear, travel goods, etc.

6. CONCLUSIONS

This paper focuses on the analysis of the relationship between trade facilitation factors and bilateral exports. In particular, both conectivity and trade facilitation factors are considered as determinants of trade. While significant advances have been made in port infrastructure development to satisfy the continued increase in transportation demand, a growing mismatch between infrastructure provision and transportation demand growth can still be observed. Additionally, recent institutional trade conflicts among trading partners indicate the need of empirical research to investigate the effect of institutional trade barriers, or trade facilitation procedures in particular on developing countries trade.

Using trade data on most countries over the period 2006-2013 this paper evaluates the effect of connectivity and trade facilitation on the expansion of exports.

Our results show that time needed to trade is a more important trade barrier for developing countries than bureaucratic procedures and that natural trade barriers, are in turn more important than institutional trade barriers, trade facilitation factors.

Further research could focus on estimations for different types of countries according to their level of development, in order to provide a better understanding of the role played by trade facilitation factors in developing countries.

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TABLES

TABLE 1. SUMMARY STATISTICS

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Ln GDP_exp	267,813	24.042	2.444	16.947	30.451
Ln GDP_imp	265,696	24.004	2.455	16.947	30.451
Ln pop_exp	267,813	15.575	2.128	9.183	21.029
Ln pop_imp	265,696	15.535	2.159	9.183	21.029
Ln dist	278,208	8.757	0.827	0.651	9.899
Ln area_imp	278,208	11.306	2.675	3.401	16.654
Ln area_exp	278,208	11.373	2.614	3.401	16.654
landlocked_mp	278,208	0.185	0.388	0	1
landlocked_exp	278,208	0.185	0.388	0	1
Border	278,208	0.015	0.123	0	1
Lang	278,208	0.158	0.364	0	1
Comcol	278,208	0.117	0.322	0	1
Comcur	278,208	0.146	0.353	0	1
wto2	278,208	0.016	0.125	0	1
RTA	278,208	0.596	0.491	0	1
Ln aft_exp	278,208	0.118	0.322	0	1
Ln aft_imp	61,858	-1.808	2.123	-7.837	3.126
Ln LPI	238,392	-1.549	0.459	-5.389	-0.073
Ln daysx_exp	190,284	2.825	0.488	1.792	4.625
Ln daysm_imp	190,284	2.879	0.581	1.386	4.615
Ln docx_exp	186,830	1.708	0.334	0.693	2.639
Ln docm_imp	186,830	1.859	0.364	0.693	2.833
Ln costxusd_exp	190,284	6.904	0.396	5.966	8.269
Ln costmusd_imp	190,284	7.054	0.446	5.759	8.950

Note: Ln denotes natural logarithms. See variable descriptions in Table A.1.

TABLE 2: MAIN RESULTS TOTAL EXPORTS

X_tot	(1)	(2)	(3)	(4)
VARIABLES	i,j, TFE	BFE,TFE	i,j, TFE	BFE,TFE
Llpi	1.444***	0.111*	1.353***	-0.000544
	[0.0869]	[0.0597]	[0.0927]	[0.0632]
lnmaxaft_imp	-0.0190	-0.0118	0.0428**	0.0674***
	[0.0190]	[0.0163]	[0.0183]	[0.0155]
lnmaxaft_exp	-0.0595***	-0.0490***	-0.0117	0.0329**
	[0.0184]	[0.0164]	[0.0182]	[0.0156]
noaft_imp	-0.0323*	-0.0217	-0.120***	-0.0179
	[0.0193]	[0.0166]	[0.0236]	[0.0170]
noaft_exp	-0.0587**	-0.0526**	-0.0183	-0.0347*
	[0.0237]	[0.0209]	[0.0327]	[0.0188]
ldaysx_exp	-0.376***	-0.418***	-0.224***	-0.222***
	[0.0640]	[0.0547]	[0.0689]	[0.0612]
ldaysm_imp	0.102**	0.0723	0.0819	0.0822*
	[0.0505]	[0.0440]	[0.0558]	[0.0491]
lcostxusdcont_exp	-0.134**	-0.192***	-0.132**	-0.175***
	[0.0631]	[0.0560]	[0.0671]	[0.0582]
lcostmusdcont_imp	-0.0104	-0.00304	-0.00720	0.0173
	[0.0567]	[0.0501]	[0.0591]	[0.0524]
lndocm_imp	0.0656	0.0143	0.0196	-0.0800*
	[0.0515]	[0.0423]	[0.0517]	[0.0433]
lndocx_exp	0.0836	0.149**	0.00273	0.0369
	[0.0719]	[0.0647]	[0.0753]	[0.0671]
Lyi	0.297***	0.360***	0.323***	0.383***
	[0.0582]	[0.0530]	[0.0662]	[0.0599]
Lyj	0.731***	0.694***	0.749***	0.707***
	[0.0561]	[0.0485]	[0.0647]	[0.0579]
lpop_exp	1.048***	1.164***	0.0620	0.326
	[0.291]	[0.274]	[0.309]	[0.289]
lpop_imp	0.113	0.0925	-0.0950	0.000273
	[0.187]	[0.168]	[0.250]	[0.222]
Ldist	-1.498***		-1.499***	
	[0.0286]		[0.0296]	
Border	-0.132		-0.0984	
	[0.142]		[0.144]	
Lang	0.879***		0.877***	
	[0.0508]		[0.0520]	
Comcol	0.319***		0.303***	
	[0.0711]		[0.0736]	
Comcur	-0.220		-0.220	
	[0.147]		[0.148]	
wto2	-0.00557	0.0494	-0.0861	-0.0569
	[0.0853]	[0.0473]	[0.0998]	[0.0560]
Rta	0.392***	-0.0726*	0.407***	-0.0975**

	[0.0440]	[0.0428]	[0.0469]	[0.0488]
Observations	68,230	68,230	58,085	58,085
R-squared	0.780	0.065	0.780	0.052
Number of id		12,708		12,362

Notes: ***, **, * indicate significance at 1%, 5% and 10%, respectively. Robust standard errors are reported in brackets below each coefficient clustered at the bilateral level. Columns (1) and (3) present results with origin and destination and time fixed effects, (2) and (4) present estimation results with country-pair and year fixed effects.
In columns 3 and 4 the variables related to aid for trade are lagged two periods and the variables related to trading across borders (days, documents and cost to trade) are lagged 1 period.

TABLE 3. MAIN RESULTS DISAGGREGATED EXPORTS (with lagged trade facilitation variables)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	X_agri	X_raw	X_ener	X_mach	X_chem	X_other
Llpi	0.138	-0.0103	0.253	**0.419*** **	0.112	0.0299
	[0.0932]	[0.118]	[0.211]	[0.101]	[0.101]	[0.0881]
L.ldaysx_exp	0.0738	**-0.250** **	0.463*	0.0476	0.289**	**-0.344*** **
	[0.0971]	[0.127]	[0.262]	[0.124]	[0.114]	[0.109]
L.ldaysm_imp	0.0764	-0.0811	-0.0626	-0.197**	-0.0449	-0.0829
	[0.0854]	[0.107]	[0.220]	[0.100]	[0.0938]	[0.0855]
L2.lnmaxaft_imp	0.0578***	0.0165	0.0144	0.0231	0.0303*	0.0209
	[0.0170]	[0.0240]	[0.0474]	[0.0232]	[0.0184]	[0.0196]
L2.lnmaxaft_exp	-0.0292*	**0.0575** **	0.0185	0.0259	**0.0737*** **	0.0310
	[0.0174]	[0.0232]	[0.0491]	[0.0258]	[0.0227]	[0.0191]
noaft_imp	0.0239	-0.0277	0.0931*	-0.00474	0.0343	-0.0180
	[0.0196]	[0.0279]	[0.0518]	[0.0261]	[0.0233]	[0.0220]
noaft_exp	0.00702	0.0455	-0.0705	0.117***	-0.0358	0.0556**
	[0.0257]	[0.0322]	[0.0637]	[0.0324]	[0.0296]	[0.0270]
L.lcostxusdcont_exp	0.0853	-0.0390	0.220	-0.0620	-0.124	-0.275***
	[0.0768]	[0.101]	[0.233]	[0.102]	[0.0984]	[0.0816]
L.lcostmusdcont_imp	0.0378	-0.0767	-0.122	0.181**	0.0304	0.235***
	[0.0658]	[0.0930]	[0.159]	[0.0844]	[0.0830]	[0.0861]
L.lndocm_imp	-0.0827	-0.0804	0.0562	-0.238**	-0.0410	-0.0582
	[0.0761]	[0.0958]	[0.232]	[0.106]	[0.0841]	[0.0825]
L.lndocx_exp	-0.226*	-0.166	0.579*	-0.205	-0.315**	-0.229*
	[0.120]	[0.133]	[0.305]	[0.129]	[0.154]	[0.139]
Lyi	0.157**	0.196*	0.0433	0.443***	0.191*	-0.0241
	[0.0791]	[0.106]	[0.209]	[0.107]	[0.103]	[0.0973]
Lyj	0.576***	0.453***	0.237	0.752***	0.460***	0.592***
	[0.0791]	[0.0989]	[0.196]	[0.0930]	[0.0856]	[0.0803]
lpop_exp	-0.931*	-1.204**	2.272**	-2.627***	0.620	-1.889***
	[0.475]	[0.554]	[1.136]	[0.485]	[0.457]	[0.458]
lpop_imp	0.0563	-0.634	-0.0263	-1.295***	-0.852**	-0.595
	[0.314]	[0.459]	[0.869]	[0.418]	[0.409]	[0.362]
wto2	0.126	0.110	0.217	-0.00821	0.0757	0.0982
	[0.0781]	[0.0967]	[0.165]	[0.0899]	[0.0789]	[0.0698]
Rta	0.193***	0.0669	-0.0123	0.0433	-0.0816	0.0128
	[0.0659]	[0.0971]	[0.178]	[0.0819]	[0.0938]	[0.0680]
Observations	38,956	34,235	22,250	39,309	35,602	42,916
R-squared	0.050	0.037	0.014	0.024	0.028	0.023
Number of id	9,764	8,916	6,336	10,107	8,991	10,755

Notes: ***, **, * indicate significance at 1%, 5% and 10%, respectively. The corresponding robust standard errors are reported in brackets below each coefficient (cluster at the country-pair level). Estimation results with country-pair and year fixed effects. In all columns the variables related to aid for trade are lagged two periods and the variables related to trading across borders (days, documents and cost to trade) are lagged 1 period.

Table 4. Change in number of days and document needed to export and import

Trading accross borders	**Days needed to Import**		**Days needed to Export**		**Number of Documents needed to Import**		**Number of Documents needed to Export**	
Country	2006	Change 2006-13	2006	Change 2006-13	2006	Change 2006-13	2006	Change 2006-13
Argentina	20	-4	16	-3	7	0	7	0
Bolivia	36	-13	24	-5	7	0	8	0
Brazil	24	-5	18	-5	8	0	7	0
Chile	16	-3	17	-2	6	0	6	0
Colombia	48	-7	34	-10	6	0	5	0
Ecuador	44	-15	22	-2	8	-1	9	-1
Paraguay	33	0	35	-2	10	0	8	0
Peru	29	-12	22	-10	8	0	6	0
Uruguay	23	-1	23	-7	8	0	7	0
Av LA 2006	30.33	-6.67	23.44	-5.11	7.56	-0.11	7	-0.11
Av OECD 2006	19.1	-4.52	16.7	-3	6.62	0	5.42	0

Source: World Bank Doing Business Dataset.

APPENDIX

Table A.1. Variable description and data sources

Variable name	Description	Source
Ln GDP_exp	Exporter Gross Domestic Product at current prices	World Bank Development Indicators
Ln GDP_imp	Importer Gross Domestic Product at current prices	
Ln pop_exp	Population of exporter country in number of inhabitants	
Ln pop_imp	Population of importer country in number of inhabitants	
Ln dist	Distance between capital cities	CEPII
Ln area_imp	Area of the importer	
Ln area_exp	Area of the exporter	
landlocked_mp	Dummy variable takes the value of one if the importer is landlocked	
landlocked_exp	Dummy variable takes the value of one if the exporter is landlocked	
border	Dummy variable takes the value of one if partner countries are sharing a border	
Lang	Dummy variable takes the value of one if partner countries are sharing a common language	
comcol	Dummy variable takes the value of one if partner countries have ever had a colonial relationship	
comcur	Dummy variable takes the value of one if partner countries have a common currency	De Sousa (2012)
wto2	Takes the value of one if country *i* or country *j* are WTO members and two if both are members	
RTA	Dummy variable takes the value of one if partner countries have a regional trade agreement	
lnmaxaft_imp	Maximum aid for trade received by importer country at year t-2Maximum aid for trade received	OECD Trade Facilitation Indicators
Lnmaxaft_exp	by exporter country at year t-2	
Noaft_imp	Dummy variable takes the value of one if importer country don't receive any aid for trade	
Noaft_exp	Dummy variable takes the value of one if exporter country don't receive any aid for trade	
Ln LPI	Logistic Performance Index	UNCTAD
Ln daysx_exp	Days for exports for the exporter country	World Bank Doing Business
Ln daysm_imp	Days for imports for the importer country	
Ln docx_exp	Number of documents for exports for the exporter country	
Ln docm_imp	Number of documents for imports for the importer country	
Ln costxusd_exp	Costs to export (in US dollars) for exporters	
Ln costmusd_imp	Costs to imports (in US dollars) for importers	

Table A.2. Product categories

Exports	**Categories (1 digit codes)**
X=aggregated (total) exports	0+1+2+3+4+5+6+7+8+9
X_noen = Non energy exports	0+1+2+4+5+6+7+8+9
X_manu = Manufactured exports	5+6+7+8+9
X_rawm = Exports of raw materials	2+4
X_agri =Agricultural exports	0+1
X_chem = Chemical	5
X_mach = Machinery and transport equipment exports	7
X_otherm =Exports of textiles, apparel and clothing, leather, footwear, travel goods, cork, wood, paper, furniture	6+8

Note: 1 digit codes in column 2 are based on Standard International Trade Classification (SITC) Revision 3.

Table A.3 List of Countries

Algeria	Guyana	Saint Vincent and the Grenadines
Angola	Haiti	Samoa
Antigua and Barbuda	Honduras	Saudi Arabia
Argentina	Iceland	Senegal
Australia	India	Seychelles
Bahamas	Indonesia	Sierra Leone
Bahrain	Iran	Singapore
Bangladesh	Iraq	Slovenia
Barbados	Ireland	South Africa
Belgium	Israel	Spain
Belize	Italy	Sri Lanka
Benin	Jamaica	Suriname
Brazil	Japan	Sweden
Brunei	Jordan	Syria
Bulgaria	Kenya	Thailand
Cambodia	Kiribati	Togo
Cameroon	Kuwait	Tonga
Canada	Latvia	Trinidad and Tobago
Chile	Lebanon	Tunisia
China	Liberia	Turkey
Colombia	Lithuania	Ukraine
Comoros	Madagascar	United Arab Emirates
Congo	Malaysia	United Kingdom
Costa Rica	Maldives	United States
Croatia	Malta	Uruguay
Cyprus	Mauritania	Vanuatu
Denmark	Mauritius	Vietnam
Djibouti	Mexico	Yemen
Dominica	Morocco	
Dominican Republic	Mozambique	
Ecuador	Namibia	
Egypt	Netherlands	
El Salvador	New Zealand	
Equatorial Guinea	Nicaragua	
Eritrea	Nigeria	
Estonia	Norway	
Fiji	Oman	
Finland	Pakistan	
France	Palau	
Gabon	Panama	
Gambia	Papua New Guinea	
Georgia	Peru	

Germany	Philippines
Ghana	Poland
Greece	Portugal
Grenada	Qatar
Guatemala	Russia
Guinea	Saint Kitts and Nevis
Guinea-Bissau	Saint Lucia

Table A.4 Averages values for trade facilitation factors in levels

Variable	Obs	Obs	Mean	Std. Dev.	Min	Max
aft_exp		465,730	0.13	0.92	-0.08	22.774
ndocx_exp		186,830	5.82	1.88	2	14
ndocm_imp		186,830	6.83	2.32	2	17
daysm_imp		190,284	20.99	12.97	4	101
daysx_exp		190,284	19.09	10.95	6	102
costxusdcexp		190,284	1082.06	486.61	390	3900
costmusdcimp		190,284	1285.67	692.78	317	7709
LPI		465,730	0.12	0.14	0	0.93

Note: Aft in million USD, cost to M and cost to X is in USD per container.