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# The Impacts of Trade Facilitation Measures on International Trade Flows

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## Abstract

This paper analyzes the impacts of selected trade facilitation measures on international trade flows. A gravity model is used to estimate four equations: a pooled cross-section model; a fixed-effects model; a random effects model; and a Poisson maximum likelihood estimator. The contribution of the paper is twofold. First, the analysis uses a recent data set, a panel that includes trade data from 2011 and 2012 for 72 countries. Second, to measure the impacts of trade facilitation measures, the analysis includes dummy variables for the presence of an authorized economic operator program, the existence of a single-window program in the countries in the sample, and the existence of a mutual recognition arrangement between pairs of countries in the sample. The results show that the presence of an authorized economic operator program and the existence of a single-window program will improve countries' trade performance. By contrast, the existence of a mutual recognition arrangement will not necessarily improve countries' trade performance. These results suggest that, in general, trade facilitation measures as a whole will help countries improve their trade performance.


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**Keywords**

Trade facilitation; Authorized Economic Operator; Single Window; Mutual Recognition Arrangement; gravity model.

**JEL Classification**

E60; O24

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**The Impacts of Trade Facilitation Measures on International Trade Flows**

## 1. Introduction

Trade Facilitation is defined as the simplification, harmonization, standardization and modernization of procedures of international trade. Trade facilitation measures help countries reduce trade barriers and transaction costs, which will in turn help ensure the predictability of operations and contribute to the competitiveness of countries that engage in international trade (MACEDO; SÁ PORTO, 2011, p.162). This is the case particularly as protectionist tariff rates have fallen, and assessing how other factors (nontariff measures as trade facilitation measures) affect trade has increasing policy relevance (WILSON; MANN; OTSUKI, 2005, p. 841) (CANUTO, 2013). Furthermore, by reducing the waste of using human and material resources with activities that often do not add equivalent value, trade facilitation also becomes a source of increases of a country's "total factor productivity" (CANUTO, 2012).

Essentially, trade facilitation aims at harmonizing certain rules between countries to promote greater efficiency, transparency and predictability, based on norms, standards and internationally accepted practices. Thus, trade facilitation is a tool that can potentially reduce trade barriers and transaction costs, and it helps to ensure the predictability of operations, thus contributing to the competitiveness of a country (SCORZA, 2007; MACEDO, SÁ PORTO, 2011).

Portugal-Perez and Wilson (2010) show that reforms using Trade Facilitation (TF) measures substantially improve the export performance of developing countries. The authors set indicators for 112 countries using data for the period 2004-2007, and grouped them into two dimensions, one dimension of hard infrastructure and one of soft infrastructure. Hard infrastructure indicators refer to the physical infrastructure and measure the level of development and the quality of ports, airports, railways, and ITC (Information Technology and Communications) infrastructure. In turn, soft infrastructure indicators include transportation and border efficiency measures (such as time, cost and number of documents required for export and import procedures) as well as regulatory and business environment procedures (such as irregular payments indicators, government transparency and anti-corruption measures).

In fact, soft measures have been increasingly implemented and adopted by both developed and developing countries in recent years. One such measure is the Authorized Economic Operator (AEO). The AEO is a party involved in the international

movement of goods and which is recognized on its behalf or on behalf of a national customs administration for complying with supply chain security standards. To qualify as an AEO, it is necessary that the company meet the criteria specified by the Customs of the country in question, including having appropriate records of compliance with customs requirements and a satisfactory management system of commercial records (SÁ PORTO et al., 2013, p. 64).

Another important soft measure is the Single Window (SW). It is a single point of contact between foreign trade operators and government to fulfill the requirements for import, export and customs transit. Through the single window, all demands for information and documents made by the bodies involved in the trade are given in a coordinated and harmonized manner through a single interlocutor, preferably in a computerized system accessible over the Internet. Responses from government agencies to foreign trade operators must also occur in a coordinated manner through this system (SCORZA; MACEDO, 2013, p.38). Additionally, another important TF measure is the Mutual Recognition Arrangement (MRA), which is an international arrangement based on an agreement by which two or more countries agree to recognize one another's conformity assessments regarding TF measures, such as the AEO.

The objective of this paper is to analyze the impacts of those selected trade facilitation measures on international trade flows. For that we used a gravity model, such as in Wilson, Mann and Otsuki (2005) and in Souza and Burnquist (2011). However, we used a more recent data set, a panel that included trade data from 2011 and 2012 for 72 countries. Moreover, to measure the impacts of trade facilitation measures, we included dummy variables for those three trade facilitation measures mentioned above, the Authorized Economic Operator (AEO) program, the Single Window (SW) program and the Mutual Recognition Arrangements (MRA). Those three variables were used as a proxy for trade facilitation.

The paper is structured as follows. After this brief introduction, we review in Section 2 the recent literature on trade facilitation and on the gravity model, while in Section 3 we present the model and the data used in this paper. We present our main results In section 4, and in section 5 we present our conclusions and possible further research on this subject.

## 2. Literature review

In this section we will briefly review the existing literature on trade facilitation and on the gravity model. We will start with a discussion on the definition of trade facilitation, its use and role on fostering international trade. Then we will introduce the gravity equation and evaluate the empirical models that use it to analyze impacts of regional agreements and of trade facilitation measures on international trade.

### 2.1 Trade facilitation

Trade facilitation is known as the set of measures that seek to simplify, harmonize, standardize, and modernize the international trade procedures. It comprises customs procedures, logistics, licensing procedures and documentation, insurance and other financial requirements that are imposed on the entry or exit of goods from countries (BEHAR et al. 2011) (CANUTO, 2012).

Trade facilitation (TF) aims at harmonizing the several rules between countries in order to promote greater efficiency, transparency and predictability based on norms, standards, and internationally accepted practices. In this sense, TF is a tool that can potentially reduce barriers and transaction costs, in order to help ensure the predictability of operations and to thus contribute to the competitiveness of a country (SCORZA 2007; MACEDO, SÁ PORTO 2011).

There are several TF measures that could be used as a proxy for their effect on the national economies. One such measure is the Authorized Economic Operator (AEO) program, which is defined as a “party involved in the international movement of goods in whatever function that has been approved by or on behalf of a national customs administration as complying with WCO or equivalent supply chain security standards” (WCO 2014a, p.3). Another common TF measure is the Single Window (SW) program, which is defined as “a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfil all import, export, and transit-related regulatory requirements. If information is electronic, then individual data elements should only be submitted once” (UN/CEFAT, 2005, p.3).

Yet another important TF measure is the Mutual Recognition Arrangement (MRA), which is, as mentioned earlier, an international arrangement based on an agreement by which two or more countries agree to recognize one another's conformity assessments regarding TF measures. “The objective of Mutual Recognition of AEO is

that one Customs administration recognizes the validation findings and AEO authorizations by the other Customs administration issued under the other programme and agrees to provide substantial, comparable and – where possible – reciprocal benefits/facilitation to the mutually recognized AEOs. This recognition is generally premised on the existence or creation of both relevant legislation and operational compatibility of both or more programmes" (WCO 2014b, p.127).

One interesting issue is how to measure TF and how countries are positioned among themselves in the adoption of trade facilitation measures. The Enabling Trade Index - created by the World Economic Forum - measures the extent to which individual economies have developed institutions, policies, and services facilitating the free flow of goods over borders and to destination (WEF 2014). It includes four areas: market access; border administration; transport and communication infrastrucuture; and business envirionment. Each of the these four subindexes in turn is composed of a number of pillars of enabling trade, such as domestic and foreign market access; efficiency of customs administration; efficiency of import-export procedures; transparency of border administration; availability and quality of transport infrastructure; availability and quality of transport services; availability and use of ICTs; regulatory environment; and physical security.

Another important topic within the TF literature is the evaluation of the measures that countries adopt in order to implement a TF environment. For example, in the case of Brazil, CAMEX (2012) evaluated the various TF measures adopted by the country until 2012. And Sá Porto et al. (2013a) presented the country's achievements by adopting Trade Facilitation measures. They also pointed out what were the key challenges related to the implementation of such measures in the country.

Still on Brazil's experience on the implementation of TF measures, Morini (2013) analyzed the implementation of Blue Line, the customs compliance program, a type of Authorized Economic Operator (AEO) program that was implemented in the country. Macedo and Scorza (2013) in turn approached the country's Single Window (SW) program, and discussed the issues that relate to its implementation such as technical standards, data harmonization and information exchange. Finally, Sá Porto et al. (2013b) evaluated Brazil's AEO and SW implementation challenges in the light of Europe's experiences in the implementation of these measures.

### 2.2 The Gravity Model

The Gravity model has been extensively used in international economics. It was first proposed in order to account for the factors that explained the size of trade flows between two countries. These factors were of three types: one type includes the factors related to the total potential supply of the exporting country. A second type includes the factors related to the total potential demand of the importing country. And a third set of factors was the resistance to trade, be it natural or artificial trade resistance (SÁ PORTO 2002, p.8). These three types of factors are represented in the original gravity model, proposed independently by Tinbergen and Pöyhönen, and later refined by Linnemann (SÁ PORTO, 2002):

$$X_{ij} = a_0 (Y_i)^{a1} (Y_j)^{a2} (N_i)^{a3} (N_j)^{a4} (Dist_{ij})^{a5} e^{(Pref) a6} (e_{ij}), \quad (1)$$

where $X_{ij}$ is the dollar value of exports from country i to country j; $Y_i$ is the nominal value of country i's Gross Domestic Product (GDP); $Y_j$ is the nominal value of country j's GDP; $N_i$ is the population of country i; $N_j$ is the population of country j; $Dist_{ij}$ is the distance between the commercial centers of the two countries, and is used as a proxy for the trade resistance variables; Pref is a dummy variable which equals to 1 if both countries belong to a specific preferential trade area and zero otherwise; and $e_{ij}$ is the error term. The coefficients $a_0$ through $a_6$ are to be estimated by the regression.

The gravity equation has been very successful in explaining trade empirically; the estimation of the equation above applied to the trade of 80 countries, explained some 80 percent of the variance of the data (SÁ PORTO 2002, p.10). It has also been used pervasively in models that try to assess the welfare effects of economic integration (such as Aitken 1973, Soloaga and Winters 2001, Reis et al. 2014, among many others). Some studies have tried to evaluate the impacts of economic integration on the different regions of participating countries, such as Bröcker (1988), Sá Porto (2002), Sá Porto and Canuto (2002), Sá Porto and Canuto (2004), Sá Porto and Azzoni (2007), among others.[1]

With respect to the use of gravity models on trade facilitation issues, there have been many contributions using computable general equilibrium (CGE) models and gravity models. Several studies have estimated the potential effects of trade facilitation on the well-being of countries, using CGE models. One such example is APEC (1999), which used a dynamic version of the GTAP model (Global Trade Analysis Project) for

[1] For a wider literature review on the gravity model and on the regional impacts of preferential trade arrangements, see Reis et al.(2014), Cardamone (2007) and Sá Porto and Azzoni (2007).

the base year 1996 and an aggregate of 14 sectors and 21 regions to estimate the impacts of trade liberalization and trade facilitation measures among APEC members. In one of the simulations the authors assumed a reduction of 1% in costs derived from trade facilitation measures for both industrialized economies and newly industrialized countries, and of 2% for other developing economies. The results indicate that the trade facilitation measures could expand trade in 1.3% within APEC countries. Those gains represent 0.25% of GDP of member countries.

Wilson, Mann and Otsuki (2003) use a gravity model to evaluate the relationship between trade facilitation and trade flows in the Asia-Pacific region. They used four different indicators for measuring trade facilitation: port efficiency, customs environment, regulatory environment, and e-business usage. Besides the variables used in traditional gravity model such as the one in equation (1) above, they included other variables such as tarrifs. They found that regulatory barriers and port inefficiency deter trade and improvements in customs and greater e-business use significantly expand trade, but to a lesser degree than the effect of ports or regulations.

Wilson, Mann and Otsuki (2005) continued that study; they also used a gravity model and four TF indicators: port efficiency, customs environment, regulatory environment, and service sector infrastructure. But they expanded significantly the sample of countries to 75 in the period 2000-2001. Moreover, they designed a simulation to estimate the effect of improved trade facilitation on trade flows. They found that increased trade in manufacturing goods from trade facilitation improvements in all four areas yields increases in both exports and imports. Most regions increase exports more than imports in large part by increasing exports to the OECD market. The South Asia region has the greatest potential for both export and import growth, with export gains greater than import gains. In the simulation side, they found that improvement in all four forms of trade facilitation of the 'below-average' countries 'halfway' to global average yields an increase in global trade of $377 billion.[2]

Regarding the Brazilian literature concerning trade facilitation, one important contribution comes from SOUZA and BURNQUIST (2011), which used a gravity model in order to evaluate the effects of trade facilitation measures on the pattern of bilateral trade in a set of 43 countries, including Brazil as well as some of its main trading partners. For that end, they created one simplified index of export procedures and

[2] Bernard Hoekman and Selina Jackson refer to estimates produced by WEO according to which "improving border management, transport and communications infrastructure services could increase global GDP by up to six times more than removing all import tariffs." (HOEKMAN and JACKSON, 2013, p.2)

another for the simplification of import procedures. Their results suggest that improvements in the areas of trade facilitation, which would lead to a relative increase in simplifying indexes, can stimulate trade flows between countries.

## 3 Model and data

In this section we will present our model designed to evaluate the impacts of trade facilitation measures on international trade flows. We use a standard gravity model, such as the one in WILSON, MANN and OTSUKI (2005) or the one in SOUZA and BURNQUIST (2011). We use variables that have traditionally been used to explain trade, such as importer's and exporter's GDP, importer's and exporter's population, distance between the capital of the importer to the capital of the exporter, and dummy variables for preferential trade agreements. In this last case, we included dummies for the following agreements: Asean, APEC, FTAA, NAFTA, LAIA, AUNZ, Comesa, Mercosur, EU and SADC.[3] We also used dummy variables for adjacent countries and for eight different languages: English, French, Spanish, Arabic, Chinese, German, Portuguese and Russian.

But, unlike WILSON, MANN and OTSUKI (2005), or SOUZA and BURNQUIST (2011), we chose three different dummy variables to evaluate the impacts of trade facilitation on international trade flows: one for the presence of an Authorized Economic Operator (AEO) program in the importer country, one for the existence of a Single Window (SW) program in the importer country, and one for the existence of a mutual recognition arrangement (MRA) between the pairs of countries in our sample. Those three variables were used as a proxy for trade facilitation.

Moreover, we used a more recent data set, a panel that includes trade data for 72 countries for the years 2011 and 2012.[4] Thus, our chosen model is as follows:

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[3] Asean = Association of Southeast Asian Nations; APEC = Asia-Pacific Economic Cooperation; FTAA = Free Trade Area of the Americas; NAFTA = North America Free Trade Area; LAIA = Latin American Integration Association; AUNZ = Australia - New Zealand; Comesa = Common Market for Eastern and Southern Africa; Mercosur = Southern Common Market; EU = European Union; SADC = Southern Africa Development Community. For a complete and updated list of regional trade arrangements and its comprising countries, go to the WTO's site: http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx

[4] The 72 countries are: Argentina, Australia, Austria, Belgium, Bulgaria, Bolivia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Dominican Republic, Ecuador, the Arab Republic of Egypt, El Salvador, Estonia, Finland, France, Germany, Greece, Guatemala, Hong Kong SAR, China, Honduras, Hungary, Indonesia, India, Ireland, Iceland, Israel, Italy, Jamaica, Jordan, Japan, the Republic of Korea, Lithuania, Latvia, Mexico, Mauritius, Malaysia, Nigeria, Nicaragua, Netherlands, Norway, New Zealand, Panama, Peru, Philippines, Poland, Portugal, Paraguay, Romania, the Russian Federation, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, Ukraine, Uruguay, United Kingdom, United States, República Bolivariana de Venezuela, Vietnam,

$$\ln X_{ij} = \ln a_0 + a_1 \ln Y_i + a_2 \ln Y_j + a_3 \ln N_i + a_4 \ln N_j + a_5 \ln Dist_{ij} + a_6 Adjacent + a_7 English + a_8 French + a_9 Spanish + a_{10} Arabic + a_{11} Chinese + a_{12} German + a_{13} Portuguese + a_{14} Russian + a_{15} Asean + a_{16} APEC + a_{17} FTAA + a_{18} Nafta + a_{19} LAIA + a_{20} AUNZ + a_{21} Comesa + a_{22} Mercosur + a_{23} EU + a_{24} SADC + a_{25} AEO + a_{26} MRA + a_{27} SW + \log e_{ij} \quad (2),$$

where $X_{ij}$ is the dollar value of exports from the country i to country j; $Y_i$ is the nominal value of country i's Gross Domestic Product (GDP); $Y_j$ is the nominal value of country j's GDP; $N_i$ is the population of country i; $N_j$ is the population of country j; $Dist_{ij}$ is the distance between the commercial centers of country i and country j; Adjacent is a dummy variable equal to 1 if both countries are adjacent (share borders); English, French, Spanish, Arabic, Chinese, German, Portuguese, Russian are dummy variables equal to 1 if both countries speak that language, and zero otherwise; Asean, APEC, FTAA, Nafta, LAIA, AUNZ, Comesa, Mercosul, EU, and SADC are dummy variables equal to 1 if both countries belongs to that bloc, and zero otherwise; AEO and SW are dummy variables equal to 1 if the importing country has implemented a Authorized Economic Operator or a Single Window program, respectively, and zero otherwise; MRA is a dummy variable equal to 1 if both countries have implemented a mutual recognition arrangement between themselves. The function of the last three variables is to capture the impact of trade facilitation measures on international trade flows, thus acting as a proxy for trade facilitation.

We used panel data,[5] including all observations of non-zero trade between countries, and we estimated four different equations:[6] a Pooled Cross Section (PCS) model; a Fixed Effects (FE) model; a Random Effects (RE) model; and a Poisson maximum likelihood (ML) estimator. Modelling using panel data often is better than estimating cross-section models, as it helps to account for different econometric

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and Zimbabwe. We used the same sample of countries as in Wilson, Mann and Otsuki (2005), except that we excluded Bangladesh, Trinidad and Tobago and Taiwan, China, from our sample, since there were no trade data for these three countries in the years 2011 and 2012.

[5] The source of the trade data is UNCTAD (2014). The GDP and the population data for the countries in the sample was obtained from the World Bank (2014). The distance, adjacency and language information were extracted from the World Atlas MPC CD-ROM. The information on regional blocs comes from WTO (2014). The information on the Authorized Economic Operator (AEO) programs and on the Mutual Recognition Arrangements (MRA) comes from WCO (2014b). Finally, the information on the Single Window (SW) programs comes from WCO (2011).

[6] The four equations were estimated using Stata.

problems: first, using panel data aids in avoiding possible omitted variables biases (JOHNSTON; DINARDO, 2001).

Moreover, cross section models tend to underestimate the trade volume between pairs of countries with high volume of trade, and to overestimate it for pairs of countries with low volume of trade. This “heterogeneity bias” can be overcome by removing the gravity model’s assumption of a sole intercept for all trade flows between pair of countries (CHENG; WALL, 2005). Both problems could be solved using a fixed effects (FE) model,[7] as the ones used in Sá Porto and Canuto (2004) and in Sá Porto and Azzoni (2007).

Another point is that, often in gravity models there are zero trade flows between some country pairs, which could introduce problems, because the log-linearized model is not defined for observations with zero trade. In order to remove the influence of trade pairs with zero trade flows, we use an approach similar to the one used by Westerlund and Wilhelmsson (2009). They estimated the gravity model directly from its non-linear form by using a fixed effects panel Poisson maximum likelihood (ML) estimator. Since this removes the need to linearize the model by taking logarithms, the problem with zero trade disappears. Finally, in all four equations we adopted corrections for heteroscedascity and autocorrelation.

[7] Note also that, in the Fixed Effect (FE) model, variables that are invariant with time, such as distance and adjacency variables, are eliminated (Cheng and Wall, 2005).

## 4 Results

The results of the four models are displayed in Table 1. The coefficients for GDP and for distance have the expected signs and are significant for the four models, except the importer's GDP in the FE model. The coefficients for population are significant only in one case (for the FE model), but had the wrong sign (it should have been positive). Thus, GDP and distance are important to explain trade between countries in our sample of 72 countries in the 2011-2012 period. These results are similar to the ones obtained in other studies by the authors cited in section 2.

Regarding the role of the dummy variables, the adjacency dummy was significant and positive in all models (except in the FE model, in which it is not defined), indicating that even when we control for distance, countries tend to trade more with neighboring countries. As for the language dummies, the only languages that were significant and had the right sign for the coefficient in all models were English, Spanish and Russian, indicating that, *ceteris paribus*, the countries in which those languages are spoken tend to trade more than the rest of the countries in the sample.

As for the regional economic integration dummies, the only blocs that were significant and had the right sign for the coefficient in all models were APEC, LAIA and SADC. This means that, *ceteris paribus,* countries that participate in these blocs tend to trade more than the rest of the countries in the sample. Note that the coefficients for the European Union and for Nafta (except in one model) were significant in all models but had the wrong sign (negative sign), which were unexpected results. Note also that the coefficient for Mercosur was not significant, showing that the trade within that bloc has lost relevance over time.[8]

Finally, regarding the results for the trade facilitation dummies, we notice that all three variables were significant in all models but one case; however, only AEO and SW have the expected signs, whereas MRA does not. This means that, controlling for all other variables, the role of an Authorized Economic Operator program and the the role of a Single Window program is positive for world trade. That is, the presence of a AEO program and a SW program will improve a country's trade performance. By contrast, the coefficient for MRA was negative, whereas we expected a positive coefficient (the presence of a MRA was supposed to improved international trade). This shows that, *ceteris paribus*, the existence of a Mutual Recognition Arrangement will not improve the countries' trade performance. These results suggest that in general trade facilitation measures as a whole will help countries improve their trade performance.

[8] These results are opposite to those previous works (such as Sá Porto and Canuto 2004, Sá Porto 2002).

**Table 1 - Gravity Equation Coefficients Estimates for the Trade Flows between 72 Countries, PCS, FE, RE and ML models, 2011 – 2012**

| Variable | PCS | FE | RE | ML |
|---|---|---|---|---|
| Constant $a_{0ij}$ | -24,89*** | 406,34*** | -24,98*** | -24,53*** |
| | (0,51) | (51,98) | (0,49) | (1,87) |
| $Y_i$ | 1.10*** | 0.25 | 1.06*** | 1.04*** |
| | (0.02) | (0.83) | (0.08) | (0.11) |
| $Y_j$ | 0.95*** | 1.13*** | 0.98*** | 0.98*** |
| | (0.02) | (0.01) | (0.02) | (0.01) |
| $N_i$ | -0.07 | -25.10 | -0.02 | -0.01 |
| | (0.02) | (3.48) | (0.08) | (0.11) |
| $N_j$ | -0.02 | -0.20*** | -0.01 | -0.00 |
| | (0.02) | (0.01) | (0.02) | (0.01) |
| $Dist_{ij}$ | -1.12*** | - | -1.15*** | -1.15*** |
| | (0.02) | | (0.02) | (0.02) |
| Adjacency | 0.48*** | - | 0.38*** | 0.38*** |
| | (0.11) | | (0.10) | (0.10) |
| English | 0.54*** | 0.73*** | 0.71*** | 0.72*** |
| | (0.08) | (0.09) | (0.08) | (0.08) |
| French | -0.96 | 1.23*** | -1.09 | -1.09 |
| | (0.54) | (0.54) | (0.49) | (0.48) |
| Spanish | 1.24*** | 1.33*** | 0.82*** | 0.81*** |
| | (0.12) | (0.13) | (0.11) | (0.11) |
| Arabic | 0.78 | 5.07*** | 1.68** | 1.70** |
| | (0.94) | (0.93) | (0.84) | (0.83) |
| Chinese | 1.24** | 1.90*** | 0.32 | 0.30 |
| | (0.39) | (0.39) | (0.35) | (0.35) |
| German | -0.02 | 1.71** | -0.15 | -0.15 |
| | (0.55) | (0.54) | (0.49) | (0.49) |
| Portuguese | -0.56 | 0.27 | 0.04 | 0.04 |
| | (0.93) | (0.93) | (0.83) | (0.83) |
| Russian | 1.81*** | 4.53*** | 2.07*** | 2.08*** |
| | (0.30) | (0.30) | (0.27) | (0.27) |
| Asean | 0.72 | 2.37 | 0.05 | 0.04 |
| | (0.31) | (0.31) | (0.28) | (0.28) |
| APEC | 1.10*** | 0.97*** | 0.76*** | 0.75*** |
| | (0.08) | (0.09) | (0.08) | (0.08) |
| FTAA | -0.36* | 1.79** | 0.35*** | 0.36*** |
| | (0.10) | (0.11) | (0.10) | (0.10) |
| NAFTA | -1.22** | -0.16 | -0.68** | -0.67** |
| | (0.56) | (0.56) | (0.50) | (0.50) |
| LAIA | 0.47** | 0.39** | 0.41*** | 0.41*** |
| | (0.17) | (0.17) | (0.15) | (0.15) |
| AUNZ | 0.47 | 2.24** | 0.61 | 0.61 |
| | (0.94) | (0.93) | (0.84) | (0.83) |
| Comesa | -0.14 | 1.05** | 0.66 | 0.68 |
| | (0.57) | (0.57) | (0.51) | (0.51) |
| Mercosur | 0.44 | 1.30*** | -0.05 | -0.06 |
| | (0.33) | (0.33) | (0.30) | (0.30) |
| EU | -0.51*** | 0.78*** | -0.70*** | -0.70*** |
| | (0.11) | (0.11) | (0.10) | (0.10) |
| SADC | 2.85*** | 4.67*** | 3.13*** | 3.13*** |
| | (0.58) | (0.58) | (0.51) | (0.51) |
| AEO | 0.33*** | -1.26 | 0.45*** | 0.47*** |
| | (0.05) | (1.13) | (0.20) | (0.28) |
| SW | 0.54*** | 0.49*** | 0.67*** | 0.70*** |
| | (0.04) | (0.05) | (0.20) | (0.25) |
| MRA | -0.53*** | -0.55*** | -0.69*** | -0.69*** |
| | (0.13) | (0.13) | (0.12) | (0.12) |
| $R^2$ | 0.70 | 0.51 | 0.69 | - |
| Number of observations | 9,958 | 9,958 | 9,958 | 9,958 |

Note: The significance levels at 10%, 5% and 1% levels are denoted by *, ** and ***, respectively, one-tail test. $X_{ij}$ (trade) is the dependent variable. Standard errors are given in parentheses. All variables except dummies are expressed in natural logarithms for all models. Estimation by OLS and ML estimator using Stata.

## 5 Conclusions

Trade facilitation is a key theme of the Doha Round of World Trade Organization multilateral negotiations. Whereas negotiations on signing an agreement on liberalizing global trade are stalled, an agreement on trade facilitation was reached at last year's WTO meeting in Bali. As of the time we write this paper, the agreement has not yet been fully corroborated in all countries and it is not standing ready for implementation. In any case, there is enough acknowledgement of the importance of that theme in today's trade arena and for multilateral trade liberalization, which is particularly relevant in a time where many countries are "going regional", that is, adopting regional (rather than multilateral) trade agreements.

In this paper, we analyzed the impact of trade facilitation measures on international trade flows by means of a gravity model, using data from 2011 and 2012 for 72 countries. We estimated four different equations: a Pooled Cross Section (PCS) model; a Fixed Effects (FE) model; a Random Effects (RE) model; and a Poisson maximum likelihood (ML) estimator. We included three dummy variables as a proxy for trade facilitation measures: the presence of an Authorized Economic Operator program, the existence of a Single Window program, and the existence of a Mutual Recognition Arrangement between pairs of countries in our sample.

We found that the presence of an Authorized Economic Operator program and the existence of a Single Window program will improve countries' trade performance. By contrast, the existence of a Mutual Recognition Arrangement will not necessarily improve the countries' trade performance. These results suggest that in general trade facilitation measures as a whole will help countries improve their trade performance.

This study can be extended in several ways. First, other variables could be included to control for the presence of other effects on trade that could be otherwise attributed to our TF variables, such as tariffs, inflation and exchange rate. Moreover, other TF measures besides ours could be included, such as the ones included in Wilson, Mann and Otsuki (2005) and in Souza and Burnquist (2011).

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