Out of the Border Labyrinth

An Assessment of Trade Facilitation Initiatives in Latin America and the Caribbean

Christian Volpe Martincus

Special Report on Integration and Trade

IDB

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IDB
Inter-American Development Bank

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library
Volpe Martincus, Christian.

Out of the border labyrinth: an assessment of trade facilitation initiatives in Latin America and the Caribbean / Christian Volpe Martincus.

p. cm.
Includes bibliographic references.
978-1-59782-270-1 (Paperback)
978-1-59782-271-8 (PDF)

1. Foreign trade regulation-Latin America. 2. Foreign trade regulation-Caribbean Area. 3. Customs administration-Latin America. 4. Customs administration-Caribbean Area. 5. Latin America-Commercial policy. 6. Caribbean Area-Commercial policy. I. Inter-American Development Bank. Integration and Trade Sector.

HF1480.5 .V65 2016
IDB-BK-165

Keywords: International trade, trade policy, integration, Latin America and the Caribbean.

JEL Codes: F1, F13, F14, F15.

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>> Foreword

Tariffs are substantially lower than in the past. Advances in information and communications technology, transportation, and logistics have made it possible to move goods around the world faster and at lower cost. This means that small producers can become part of large global value chains, and consumers can go online and buy products from anywhere in the world. Most importantly, it gives producers and consumers in the developing world the opportunity to participate in and benefit from global trade.

After a decade of expansion, Latin American and Caribbean countries have recently experienced declining trade and growth. In this context, reducing high trade costs that still limit the extent to which these countries can take advantage of opportunities opened up by international markets has become more imperative than ever.

The Inter-American Development Bank's Integration and Trade Sector has undertaken a number of studies that examine the determinants and implications of these trade costs, including *Unclogging the Arteries* (2008), *Bridging Regional Trade Agreements in the Americas* (2009), *Odyssey in International Markets* (2010), *Too Far to Export* (2013), and *Synchronized Factories* (2014). These reports have made important contributions to understanding the multitude of tariffs, non-tariff barriers, and associated costs that exporters and importers are confronted with when trading from the region.

Complementing the evidence presented in these reports, *Out of the Border Labyrinth* focuses on the obstacles to moving goods across borders in a fast and cost-effective way. In Latin America and the Caribbean, firms engaging in international trade still face cumbersome procedures at the border, and there is a lack of appropriate built-in technology to improve these procedures. This creates thick, labyrinth-like borders.

Understanding the very specific barriers faced by individual firms and crafting innovative new solutions calls for a micro analysis of these barriers. This report does just that. *Out of the Border Labyrinth* looks at specific policies that influence border crossing times by analyzing novel transaction-level micro data that allow us to see these policies for the first time at their actual working level. In particular, this report carefully documents the trade impact of a series of policy interventions that streamline trade-related border procedures and reduce the associated processing times. These interventions are collectively known as *trade facilitation policies* and are covered in the World Trade Organization's 2013 Trade Facilitation Agreement.

Out of the Border Labyrinth shows that trade facilitation policies have a positive and significant effect on trade by firms and their countries. One of the main mechanisms through which these measures support trade is by increasing the number of shipments crossing the border. This means that companies can export more often and respond faster to the demands of buyers, thus increasing their participation in global value chains.

Facilitating trade requires Latin American and Caribbean countries to take further action in implementing specific reforms, as discussed in the policy recommendation section of this report. This section will help countries adapt to the demands of trade in the 21st century, as well as guide the operational and training activities of the Inter-American Development Bank and other international organizations in support of these efforts.

Antoni Estevadeordal
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Inter-American Development Bank

>> Preface

Trade costs are a key determinant of economic outcomes. These costs arise when carrying goods to or from countries' borders (i.e., domestic transport costs), when shipping goods between origins and destinations (i.e., international transport costs), and when searching for business opportunities in general and commercial partners in particular (i.e., information costs), among other things. The determinants and implications of these costs have been extensively explored in the academic literature and have been the subject of dedicated reports by the Integration and Trade Sector (INT) of the Inter-American Development Bank (IDB) including those by Mesquita Moreira, Volpe Martincus, and Blyde (2008); Mesquita Moreira, Blyde, Volpe Martincus, and Molina (2013); Volpe Martincus (2010); and Blyde (2014).

An important portion of trade costs specifically originates at the borders. Tariffs and nontariff barriers are a well-known component of these costs. A large number of studies have investigated these trade-policy-induced costs, including a series of INT reports (i.e., Devlin, Estevadeordal, and Stein 2002; Estevadeordal, Suominen, Harris, and Shearer, 2009; Mesquita Moreira, forthcoming). What has been less thoroughly examined to date is that firms engaging in international trade are confronted daily with cumbersome procedures and a lack of appropriate, state-of-the-art processing technologies. This generates thick, labyrinth-like borders in several regions around the world and in Latin America and the Caribbean in particular. Crossing these borders therefore is time-consuming and costly.

Out of the Border Labyrinth focuses precisely on policy interventions that aim to streamline trade-related border procedures, typically along with the incorporation of new information technology to complete those

procedures, to reduce border times and the associated costs. These interventions are generically known as trade facilitation policies.

Latin American and Caribbean countries have recently implemented various initiatives toward these ends. Concepts such as risk management, authorized economic operators, single windows, and transit trade are now part of many practitioners' everyday activities. Furthermore, these concepts are cornerstones of the World Trade Organization's Agreement on Trade Facilitation signed by countries in December 2013 in Bali, and they are the subject of several loan operations and technical cooperation projects by the IDB and other international organizations.

Importantly, these concepts can open up an entirely new dimension of policy-driven research in international trade. However, they are largely unknown to the broad academic community. The few researchers who have examined the effects of border times on trade lacked the appropriate data and had to resort to basic aggregate measures of these times. These measures do not always properly distinguish between the time related to necessary procedures and firm-driven times, and they fail to show the enormous variance in these times across trade flows in given countries. This has relevant consequences for measurement (and cross-country comparisons) of border times and estimating their trade effects, thus limiting the scope of the existing research in this area and the lessons derived from it.

On the academic front, several researchers have contributed to the growing international trade literature using transaction-level data to explore the determinants of firms' trade decisions and outcomes. Nevertheless, trade facilitation practitioners are not very familiar with this evolving academic literature and thus with its potential to provide valuable insights into the impact of the programs they design and implement by exploiting transaction-level data on border times that the agencies they work for generate on a daily basis.

Hence, research and policy practice have been largely disconnected. *Out of the Border Labyrinth* aims to facilitate a meeting between these two worlds in order to support complementarities and synergies and to gain a deeper understanding of the influence of border agency actions on firms' and their countries' international trade. This in turn will better inform policymaking and technical assistance activities by international organizations such as the IDB.

Toward this end, this report goes analytically beyond generic, aggregated border frictions usually explored in the academic literature. It examines well-defined policies that specifically influence border times by making use of unprecedented, transaction-level micro data that allow, for the first time, to see these policies at the level at which they actually operate, and by applying rigorous econometric methods.

Each of the first six chapters of this report draws on a dedicated technical background paper available on the IDB's website.[1] In particular, Chapters 1 to 6 are based on, respectively, Carballo, Graziano, Schaur, and Volpe Martincus (2016a); Volpe Martincus, Carballo, and Graziano (2015, 2016); Carballo, Schaur, and Volpe Martincus (2016a); Carballo, Schaur, and Volpe Martincus (2016b); Carballo, Graziano, Schaur, and Volpe Martincus (2016b); and Carballo, Graziano, Schaur, and Volpe Martincus (2016c).

Chapter 1 discusses various existing indicators of border times and proposes an approach to properly measure them and assess their effects on trade outcomes. The report then describes relevant case studies and presents the results of impact evaluations of a series of concrete trade facilitation initiatives introduced throughout Latin America and the Caribbean. These include initiatives for risk management (Chapter 2), authorized economic operators (Chapter 3), simplified postal export regimes (Chapter 4), single windows (Chapter 5), and streamlined transit schemes (Chapter 6). The report concludes with an overall summary and a number of policy recommendations directed toward a more comprehensive and internationally consistent trade facilitation framework (Chapter 7).

[1] See http://www.iadb.org/en/topics/trade/out-of-the-border-labyrinth,20206.html.

>> Acknowledgments

The technical background studies upon which the first six chapters of this report are based are the outcome of a collaborative research initiative involving researchers at different universities and the Inter-American Development Bank (IDB). The researchers include Bruce Blonigen (University of Oregon), who was the research project's technical advisor, Jerónimo Carballo (University of Colorado), Alejandro Graziano (University of Maryland), Jacint Jordana (Institut Barcelona d'Estudis Internacional), Georg Schaur (University of Tennessee), and Christian Volpe Martincus (IDB), who was the research project's technical leader. Federico Bennett, Victoria Valente, and Carlos Salamanca Malagón, all from the IDB, provided excellent research assistance. Useful comments and suggestions from participants at multiple conferences, workshops, and seminars where the preliminary versions of these studies were presented helped to substantially improve them.

It should also be emphasized that the report and the studies on which it is based would not have been possible without the unconditional support of Santiago Levy, the IDB Vice-President for Sectors and Knowledge (VPS), and Antoni Estevadeordal, Manager of the IDB's Integration and Trade Sector (INT). The author thanks Juan José Bravo Moisés, Sandra Corcuera-Santamaría, and Manuel Marquez Fariña of the IDB for their inspiration, valuable advice, and wholehearted collaboration. The author is also grateful for the generous cooperation of a number of other colleagues, including Arnaldo Alvarado Burga (SUNAT – Peru), Rose Mary Antunes (Ministry of Communications – Brazil), Gabriel Aqueveque Calderón (SNA – Chile), Miguel Avendaño (DGA – El Salvador), Blanca Barandarian Asparin (SUNAT – Peru), Heike Barczyk (WCO), Daniel Bernhofen (American University), Joaquin Blaum (Brown University),

Juan Blyde (IDB), Meredith Broadbent (USITC – United States), Virginia Brown (USAID – United States), Lorenzo Caliendo (Yale University), Ernani Checcucci (Receita Federal – Brazil), Javier Claros (DGA – El Salvador), Isabel Clavijo (SAT – Mexico), Marcela Colmenares Amaya (IDB), Leticia Contreras Sánchez (SAT – Mexico), Carlos Diaz (PROMPERU – Peru), Wendy Eitan (Universal Postal Union), Guillermo Ericastilla (SAT – Guatemala), Ignacio Estévez (IDB), Milagros Fonrouge (IDB), Jhon Fonseca (COMEX – Costa Rica), Alan Fox (USITC – United States), Luis Fernando Fuentes (MINCIT – Colombia), Francisco Gamboa (PROCOMER – Costa Rica), Pablo Garcia (IDB), Aurelio Garcia Navarrete (IDB), Gladis Genua (CAF), Daniel Godinho (MDIC – Brazil), Federica Gómez Decker (IDB), Jaime Granados (IDB), Russell Hillberry (Purdue University), Robert Ireland (WCO), Myrna Irizarry (CBP – United States), Brian Kovak (Carnegie Mellon University), Kala Krishna (Pennsylvania State University), Juan Labraga (Universidad ORT – Uruguay), Lourdes Landa Flores (SAT – Mexico), Mikael Larsson (IDB), Maragarita Libby Hernández (IDB), Pilar Londoño-Kent (International Trade and Development Consultant), Alfonso Luyo Carbajal (SUNAT – Peru), Anna Maria Mayda (Georgetown University), Isabel Mejía Rivas (IDB), Eric Miller (Canadian Council of Chief Executives – Canada), Mauricio Mesquita Moreira (IDB), Evdokia Moise (OECD), Michael Moore (George Washington University), Domingo Neyra López (SUNAT – Peru), Karin Noriega Pérez (SUNAT – Peru), Marcelo Olarreaga (University of Geneva), Anny Ollague (SENAE – Ecuador), Fabrizio Opertti (IDB), Ángela Ospina Enciso (MINCIT – Colombia), Juan Ricardo Ortega (IDB), Toshihiko Osawa (WCO), Walter Pacheco (SUNAT – Peru), Julio César Paz Soldán Oblitas (SUNAT – Peru), José Raúl Perales (Center for International Private Enterprise), Justin Pierce (Federal Reserve Board of Governors – United States), Rosario Quiroz Suarez (SUNAT – Peru), Tania Quispe (SUNAT – Peru), Carolyn Robert (IDB), Martín Rossi (Universidad de San Andrés), Marisol Rodriguez Chatruc (IDB), Iván Rojas Valera (SUNAT – Peru), Fabián Ronquillo (SENAE – Ecuador), Marvin Salas (PROCOMER – Costa Rica), Pablo Sanguinetti (CAF), Álvaro Sarmiento (IDB), Elizabeth Schmelzinger (CBP-CTPAT–United States), María Elena Sierra Galindo (SAT – Mexico), Mariana Sobral de Elia (IDB), Silvia Sorescu (OECD), Lannier Sosa (PROCOMER – Costa Rica), Francisco Tapia Pérez (SAT – Mexico), Robert Teh (WTO), Olga Timoshenko (George Washington University), Julieta Toledo Cabrera

(SNA – Chile), Elizabeth Tritt (CBP-CTPAT – United States), Mario Umaña (IDB), Camila Viegas Lee (IDB), Luis Villavicencio Franco (SENAE – Ecuador), Luis Villavicencio Merino (SUNAT – Peru), Matthew Wilson (International Trade Center), Wagner Wilson de Castro (Receita Federal – Brazil), Fernando Wins (DNA – Uruguay), and Nick Zolas (US Census Bureau – United States).

Last but certainly not least, the author wishes to thank the trade-related organizations in several Latin American countries, including the *Dirección General de Aduanas* (General Customs Directorate) in Costa Rica; *Dirección General de Aduanas* (General Customs Directorate) in El Salvador; *Dirección Nacional de Aduanas* (National Customs Directorate) in Uruguay; *Ministerio de Comercio, Industria y Turismo* (Ministry of Trade, Industry, and Tourism) in Colombia; *Promotora de Comercio Exterior* (Foreign Trade Promotion Agency) in Costa Rica; *Comisión de Promoción del Perú para la Exportación y el Turismo* (Commission for the Promotion of Exports and Tourism) in Peru; *Superintendencia de Administración Tributaria* (Tax Administration Superintendency) in Guatemala; *Superintendencia de Administración Tributaria* (Tax Administration Superintendency) in Mexico; *Servicio Nacional de Aduanas* (National Customs Service) in Chile; *Servicio Nacional de Aduanas del Ecuador* (National Customs Service) in Ecuador; *Servicios Postales del Perú* (Postal Service) in Peru; *Subsecretaria de Aduana e Relações Internacionais-Receita Federal* (Undersecretary for Customs and International Relations, Federal Revenue Service) in Brazil; and *Superintendencia de Administración Tributaria* (Tax Administration Superintendency) in Peru.

>> Borders Are Thick and Measurement Matters 1

1.1 Time Is an Important Barrier to International Trade

If bicycles arrive in the U.S. warehouses of importers or wholesalers in May instead of April, the season sales peak is missed, which can result in increased inventory costs and the need to lower prices. When products are subject to fashion cycles, deliveries delayed by a few days can be equally disruptive.[1] These considerations are not exclusive to consumer goods; similar ones apply to their intermediate counterparts. Delays in the arrival of key components can cause costly production suspensions such as those induced by the eruption of a volcano in Iceland in some automotive plants in 2010.[2]

Taken together, these examples clearly attest to the importance of time in international trade. More generally, it has been shown that each additional day spent in reaching the United States reduces the probability that the United States sources a manufactured good from a given country by 1.5 percent.[3]

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[1] See Egan and Mody (1992).

[2] This was the case was with BMW and Nissan plants. Also illustrative in this regard are the implications of the shutdown of a Phillips microchip plant in New Mexico for Nokia, which used a multiple supplier strategy, and Ericsson, which followed a single sourcing policy (Chopra and Sodhi 2004).

[3] Hummels (2001) estimates that a day is worth 0.8 percent ad valorem for manufactured goods. In the most recent version of this study, Hummels and Schaur (2013) report that each day in transit is equivalent to an ad valorem tariff ranging between 0.6 and 2.3 percent.

Timely delivery is accordingly a key criterion for choosing a trading partner. This demand for timeliness has increased even more in recent decades, as suggested by the rising share of air cargo in international trade.[4] Among other factors, the growing importance of timely delivery can be traced to the dissemination of business practices such as just-in-time manufacturing and lean retailing. These practices, which aim to minimize inventories and their costs, require frequent replenishments of inputs or goods to respond quickly to new market information and cope with demand.[5]

Importantly, these developments take place in a context of spatial fragmentation of value chains. Thus, production processes increasingly involve a sequential, vertical trading chain that interconnects several countries and needs these connections to be timely.[6] Delayed delivery of critical inputs from other countries can generate significant costs that can be transmitted throughout the value chain, and the implied supply chain disruptions have noticeable economic effects.[7] For instance, firms suffering from these disruptions tend to have lower stock returns relative to relevant counterparts.[8] It is therefore not surprising that companies proactively seek to diversify their suppliers' base and reduce sourcing from providers with high variability in their lead times.

1.2 Borders Are Thick and Crossing Them Requires Time

The time between a given origin and a given destination generally consists of the time required to move goods between firms' facilities and ports, airports, or land borders; the time spent at the borders; and the time it takes to ship the merchandise internationally. While a number of studies have provided evidence of how domestic and international transport times affect international trade, the understanding of border times has been limited. This is due to the absence of a theoretical framework to

[4] See Hummels (2007a).

[5] See Abernathy, Dunlop, Hammond, and Weil (1999), Evans and Harrigan (2005), and Harrigan and Venables (2006).

[6] See Hummels, Ishii, and Yi (2001) and Hummels (2007b).

[7] See Harrigan and Venables (2006) and Nordas, Pinali, and Geloso Grosso (2006).

[8] See Hendricks and Singhal (2009).

analyze these border times and of adequate data to measure them and assess their trade impact.[9]

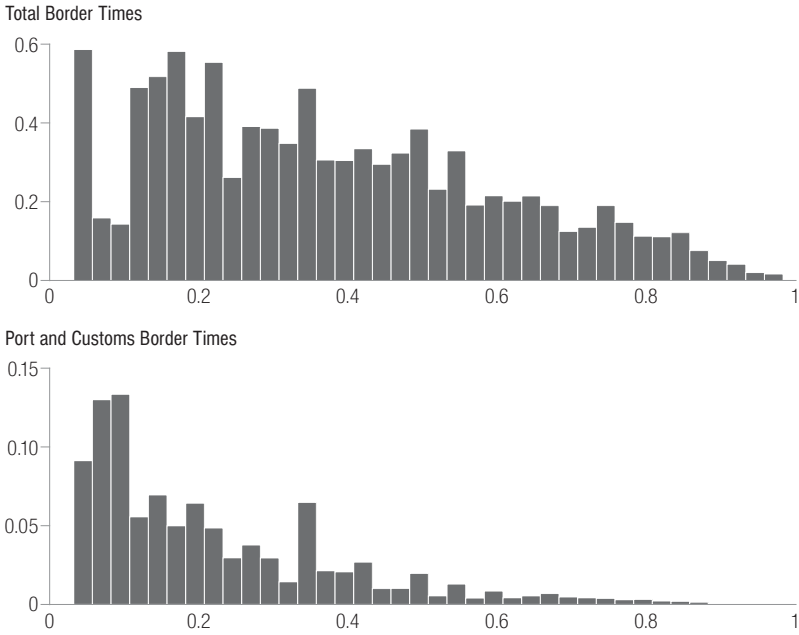
In fact, both theoretical models and empirical analyses have typically assumed dimensionless, line-type borders. Real borders, though, are thick. They are not merely a line but a region whose crossing involves multiple activities (e.g., loading-unloading, inspections, etc.) performed by multiple actors (e.g., port operators, border agencies). More specifically, borders are run by agencies that develop and administer regulations with which firms have to comply and procedures they have to follow when engaging in international trade. The aim of those regulations and procedures is to ensure security, safety, and legitimacy in general and compliance with fiscal rules in particular. Depending on how these are institutionally designed, borders can become labyrinths that are difficult to navigate and time-consuming. Therefore, in this report, the time spent at the border will be used as the primary summary measure of trade barriers due to border formalities and procedures.[10]

Time spent at the border is an important component of the total time between origin and destinations. For example, Peruvian maritime import data for 2013 reveal that, on average, total border times and port and customs processing border times respectively accounted for 37.3 percent and 21.9 percent of the time that elapsed between departure from the origin country's port and release from customs. In 25 percent of the shipments those border times represented more than 50 percent and 30 percent of total times between departure and clearance by customs (Figure 1.1). Similarly, export processing times by Uruguayan customs ranged between 1 and 31 days in 2011. The high-end figure triples the time required to ship a good from Montevideo, Uruguay's main port, to

[9] There is a large literature on border frictions (Anderson and van Wincoop 2003; Chen 2004; Head and Mayer 2000, 2010; Hillberry and Hummels 2008; McCallum 1995; Nitsch and Wolf 2013). Studies in this literature typically estimate catch-all border effects, i.e., they do not explicitly unravel the driving forces behind those effects.

[10] See Hoekman and Shepherd (2015). The Organization for Economic Cooperation and Development has developed a comprehensive set of specific indicators that correspond to the main policies covered by the World Trade Organization's Agreement on Trade Facilitation. These have been used in a series of studies that examine the determinants and effects of interventions in the respective areas (Beverelli, Neumüller, and Teh 2015; Fontagné, Orefice, and Piermartini 2016; Hillberry and Zhang, 2015; and Moise and Sorescu 2013, 2015). The World Economic Forum has also created a series of indicators that have been used in different analyses (Lawrence, Hanouz, and Doherty 2012; Hanouz, Geiger, and Doherty 2014).

Figure 1.1 ■ Peru: Share of Total Border Times and Port and Customs Times in Total Times between Port of Origin and Customs Clearance, 2013



Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* - SUNAT) and Searates.com.
Note: The figure presents the distribution of the share of total border times and port and customs processing times in total times elapsed from the port of origin to customs clearance for all imports that entered Peru through the Port of Callao in 2013. Specifically, the x axis reports the share of the total border times (upper panel) and port and customs processing times (lower panel) on total times between departure port and customs release. The y axis shows the respective share in the total number of shipments. Shipments that completed the entry process in less than 24 hours are reported as taking one day. Patterns are virtually identical if their times are set to zero.

Baltimore in the United States and amounts to 1.5 times the time needed to reach Singapore.[11]

This chapter briefly describes the general determinants of border times, discusses how these times have been measured to date, and proposes a new approach to measure border times and evaluate their trade effects.

[11] Shipping times have been taken from Sea Rates (www.searates.com), a sea-freight broker based on Miami, assuming a vessel speed of 20 knots (Berman, de Souza, Martin, and Mayer 2013). As shown in Chapter 2, 31 days was the maximum clearance time and 92 percent of the shipments were released in one day.

1.3 Why Are Borders Thick? The Determinants of Border Times

Border agencies include customs, probably the most visible entity, and a relatively large number of other government agencies. These agencies, which develop regulations and procedures that involve data requests, are responsible for health, food, quarantine, safety, and consumer protection. Survey-based evidence reveals that the median number of government agencies that have direct regulatory involvement (or require information) in cross-border transactions is 15, and that their number can reach 30 or more in some cases.[12] In particular, in a worldwide sample, the median (average) number of entities that issue import or export permits is 12 (16.6), whereas the maximum is 77 (Senegal) (Figure 1.2).[13] In Latin America and the Caribbean, the median number of these border agencies is 13.5, which is similar to that observed in Europe (14) but less than in Asia (16)

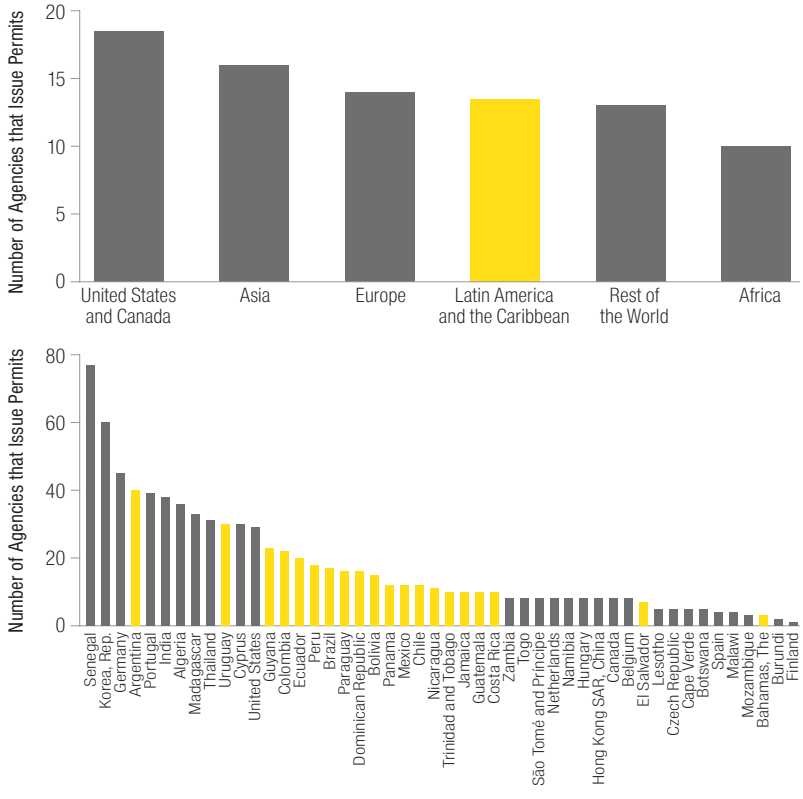
[12] See Choi (2011). In Indonesia and Nigeria there are 37 and around 50 agencies with trade regulatory compliance responsibilities, respectively (UNESCWA 2011).

[13] Regions are defined as follows:

- Latin America and the Caribbean: Argentina, The Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.
- Asia: China, Hong Kong SAR, India, Indonesia, Japan, Malaysia, the Philippines, Republic of Korea, Singapore, Taiwan Province of China, and Thailand.
- Europe (EU27): Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and the United Kingdom.
- North America: United States and Canada.
- Africa: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Dem. Rep., Congo, Rep., Côte d'Ivoire, Djibouti, Egypt, Arab Republic, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, and Zimbabwe.
- Rest of the World: remaining countries.

The individual countries included are limited to the 100 largest trading economies in the world as determined based on country-level data from the UN COMTRADE database in 2014. The tables and figures will typically report data for the Latin American and Caribbean countries and 20 non-Latin American and Caribbean peers out of these 100 countries. The latter can be more than 20 if there are ties in the values taken by reported measures.

Figure 1.2 ■ World: Total Number of Agencies that Issue Import or Export Permits, 2014



Source: Author's calculations based on data from WCO (2015).
Note: The upper panel reports the median number of border agencies that issue import or export permits for different world regions. The lower panel presents individual data for the 10 countries with the largest number of agencies, the 10 countries with the lowest number of agencies, and the Latin American and Caribbean countries. The latter are colored in yellow, whereas countries in the rest of the world are colored in dark gray. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

and North America (18.5).[14] Across countries in the region, the numbers of these entities range from 3 in The Bahamas to 30 and 40 in Uruguay and Argentina, respectively.[15]

[14] While firms do not necessarily need to interact with all these agencies every time they trade across borders but a with a subset of these depending on the sectors they operate and particularly the products they sell or buy, these totals are highly correlated with the respective average number of agencies with which firms have to work and clearly highlight the difficulties faced by multi-product firms.

[15] According to an updated institutional mapping, the number of border agencies in Argentina and Uruguay is 24.

Among many factors in addition to port efficiency, border times depend on (1) the coordination and articulation among the agencies involved and specifically their regulations and procedures (see Chapter 5); (2) the design of these regulations and procedures (i.e., whether they are streamlined or cumbersome) and the specific aspects of their implementation (e.g., operation times of 24/7 versus 8 hours, share of shipments subject to physical inspection, etc.) (see Chapter 2); (3) the technology available to complete those procedures (e.g., paper-based versus electronic forms and declarations) and whether this technology is common to or interoperable across all agencies or agency-specific (see Chapter 5); (4) the existence of special schemes for firms, shipments, and trade flows such as those for authorized economic operators (see Chapter 3), postal exports (see Chapter 4), and international transit (see Chapter 6); and (5) the resources available to the agencies to administratively process the shipments, including in particular the quantity and quality of personnel. The table and figures that follow illustrate how countries differ along some of these dimensions, namely, the hours of operation and the extent of joint inspections of border agencies as particular aspects of the actual working of procedures (Table 1.1), the percentage share of electronic processing of declarations and forms (Figure 1.3) and the integration/interoperability between the information systems of customs and other border agencies (Figure 1.4), both of which demonstrate the technological component of the process to complete procedures, and the number and profile of customs employees as one of the resources assigned to border agencies to perform their functions (Figure 1.5).

1.3.1 Operation of Agencies

Table 1.1 reveals variations across countries in the operating times and the extent to which quarantine agencies carry out their inspection activities together with other relevant border agencies.

1.3.2 Electronic Processing of Declarations and Other Forms

Figures 1.3 and 1.4 show that, while customs agencies in most countries around the world electronically process all or a big portion of export and import declarations, the share of other border agencies issuing import or export permits that are connected and interoperate with these customs

Table 1.1 ■ Selected Latin American Countries: Quarantine Agencies, Operating Times, and Joint Inspections, 2015

Country	24/7 Operations at the Border	Joint Inspection with Other Border Agencies
Argentina	No	Yes
Bolivia	No	Yes
Brazil	Yes	No
Chile	Yes	No
Colombia	No	Yes
Costa Rica	No	No
Ecuador	No	No
El Salvador	No	No
Guatemala	No	No
Honduras	No	No
Nicaragua	No	No
Panama	No	No
Paraguay	No	No
Peru	No	No
Uruguay	Yes	Yes

Source: Camacho (2013) and information provided by IDB specialists in the field.

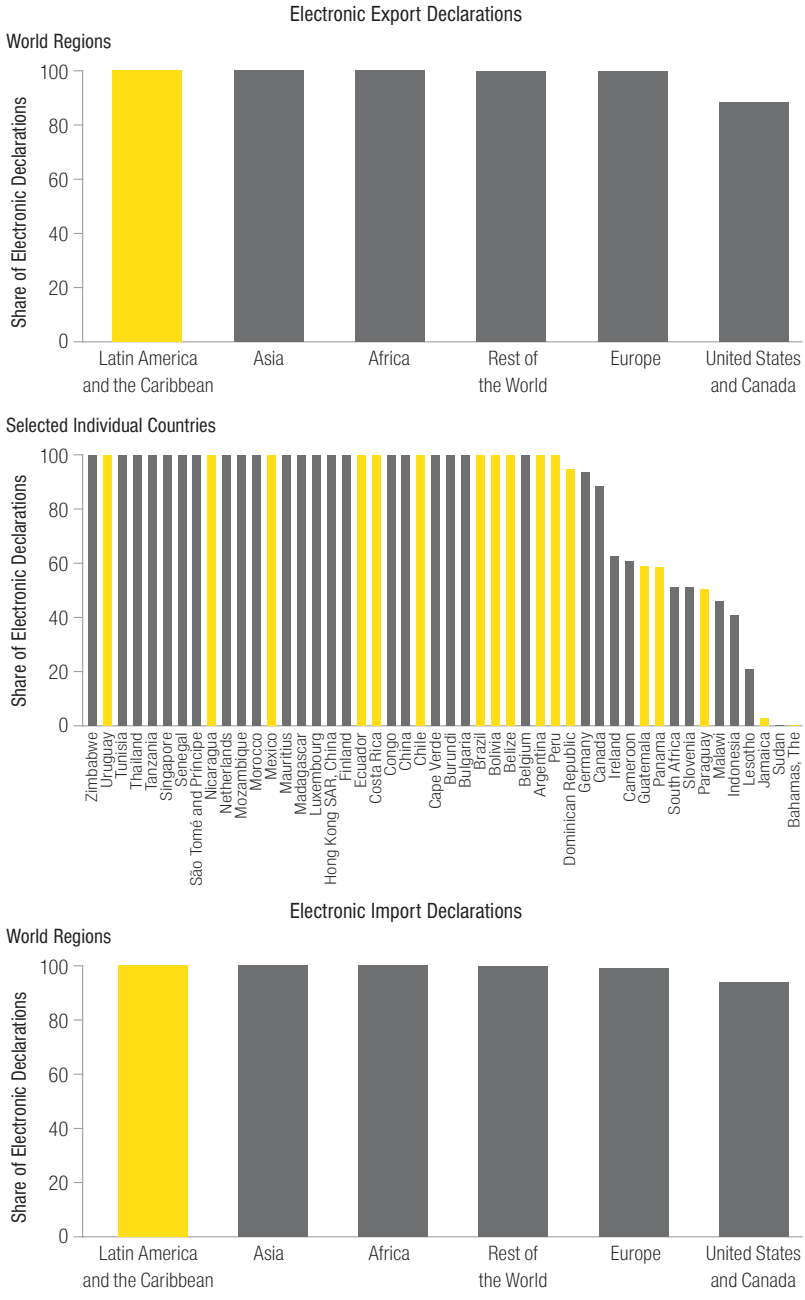
information systems is generally low. In Latin America and the Caribbean, the median (mean) share is 25 percent (37 percent), which is identical (similar) to the worldwide share but smaller than shares in North America and Asia. In particular, the share of electronically interconnected agencies goes from zero in Guatemala to 100 percent in Costa Rica, Brazil, and Mexico.[16]

1.3.3 Number of Employees in Customs Agencies

The upper panels of Figure 1.5 present the number of customs employees, both as regional medians (first panel) and for specific countries (second panel). Personnel numbers vary significantly. The median (mean) number of employees is roughly 1,700 (4,800). The number of

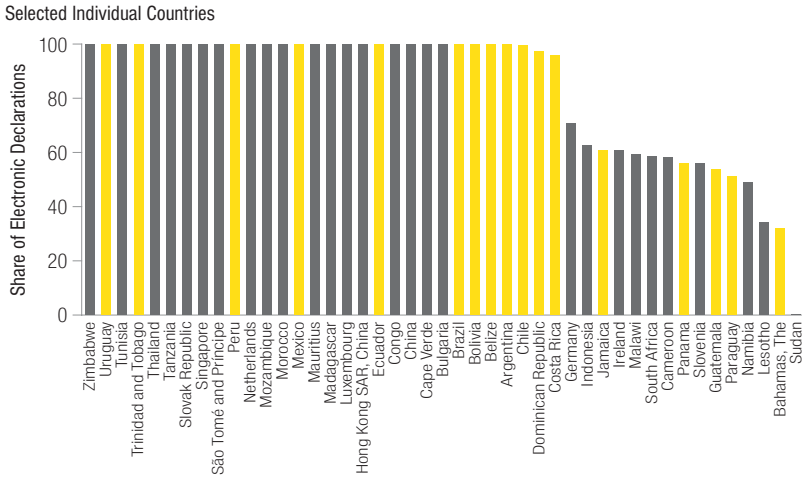
[16] Interestingly, in Senegal, which has the largest number of self-reported border agencies that issue import or export permits, almost all of these agencies (i.e., more than 97 percent) are electronically linked to the respective customs information system.

Figure 1.3 ■ World: Percentage Share of Electronic Export and Import Declarations, 2014



(continued)

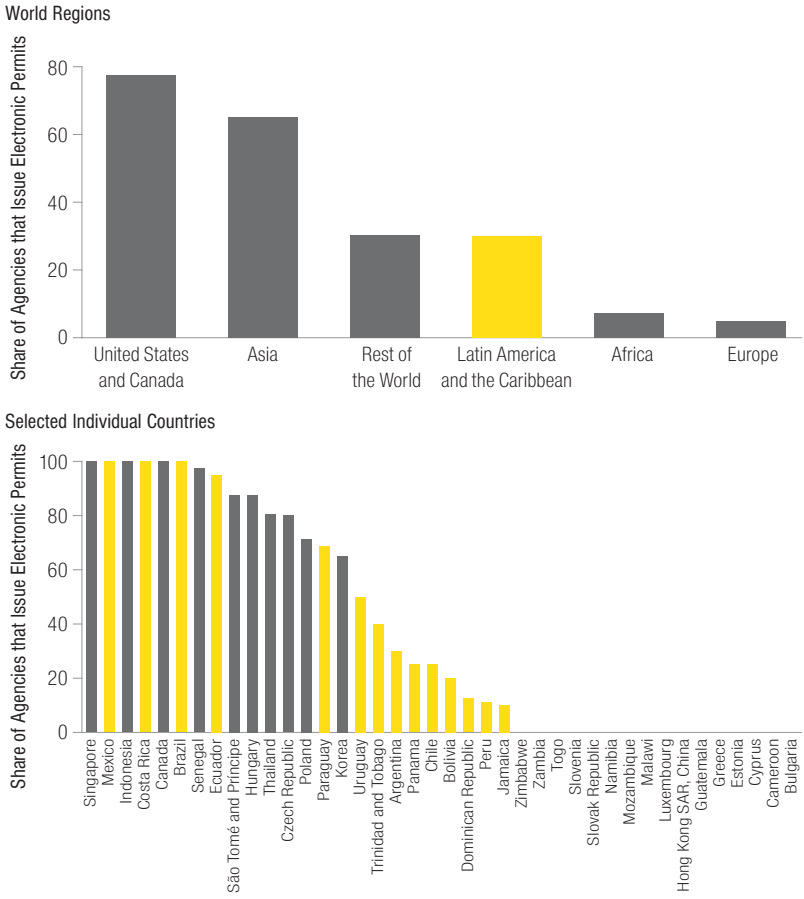
Figure 1.3 ■ World: Percentage Share of Electronic Export and Import Declarations, 2014 (*continued*)



Source: Author's calculations based on data from WCO (2015).
Note: The first panel reports the median percentage share of electronically processed export declarations among the total number of export declarations for different world regions, while the third panel shows the median percentage share of electronically processed import declarations among the total number of import declarations across regions. The second and fourth panels present the respective individual data for the 10 countries with the largest percentage shares, the 10 countries with the lowest percentage shares, and the Latin American and Caribbean countries. The latter are colored in yellow, whereas countries in the rest of the world are colored in dark gray. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

personnel is largest in India (70,000), the United States (60,000), and China (57,000). In Latin America and the Caribbean, staff number around 170 in Belize and Guyana at the lower end and approximately 7,700, 5,200, and 4,800 in Mexico, Argentina, and Colombia at the upper end, respectively. As shown in the third panel of Figure 1.5, except for a few countries such as The Bahamas, Panama, and the Dominican Republic, the numbers of customs employees in Latin American and the Caribbean countries are generally below or at the level that could be expected given the countries' respective total populations. The fourth panel reveals that countries such as China, Germany, Japan, Korea, Netherlands, Singapore, and, in the region, Brazil, Chile, Costa Rica, El Salvador, Guatemala, and Mexico, have a relationship between the number of declarations and the number of employees that is larger than the estimated average across economies. Most economies in the region are close to that average.

Figure 1.4 ■ World: Percentage Share of Agencies Issuing Import or Export Permits that Are Connected with Customs Systems, 2014

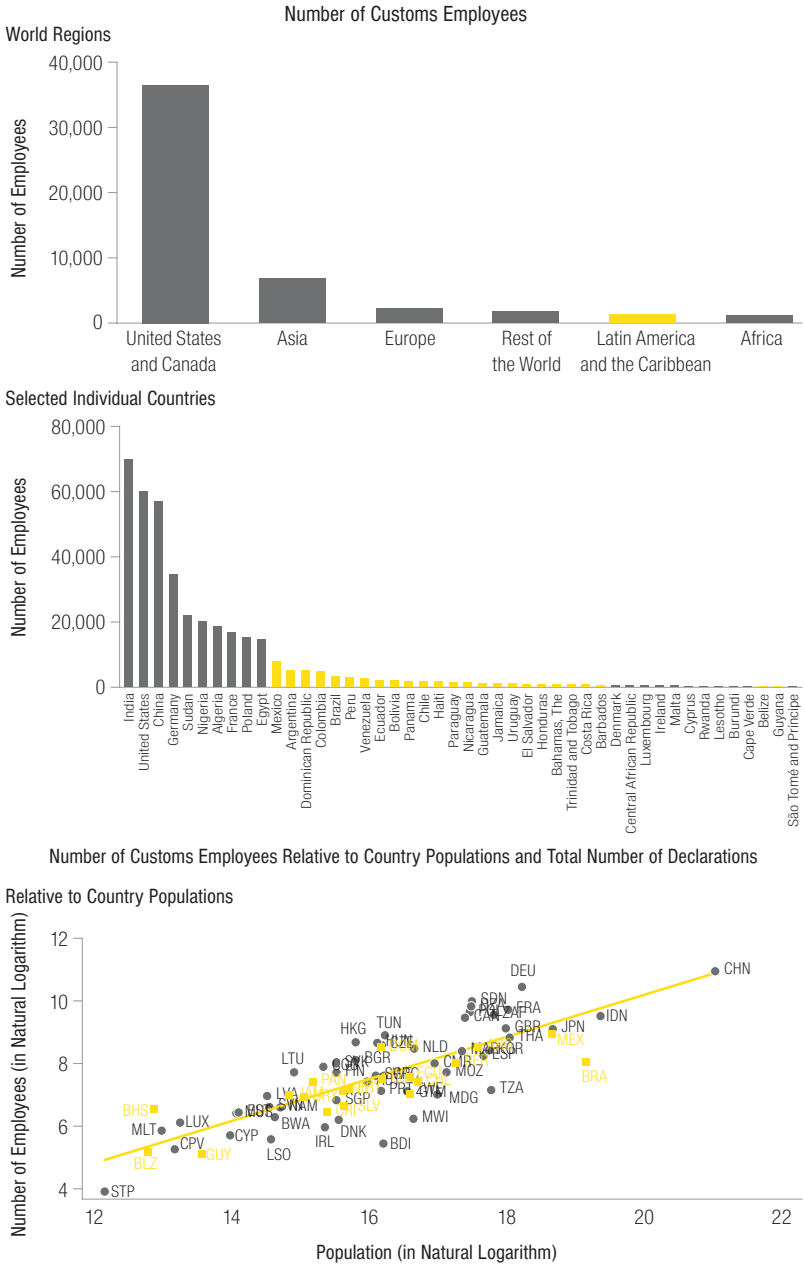


Source: Author's calculation based on data from WCO (2015).
Note: The upper panel reports the median percentage share of border agencies issuing import or export permits that are electronically connected to the customs information system for different world regions, while the lower panel shows the respective individual data for the 10 countries with the largest percentage shares, the 10 countries with the lowest percentage shares, and the Latin American and Caribbean countries. The latter are colored in yellow, whereas countries in the rest of the world are colored in dark gray. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

1.3.4 Profile of Customs Employees

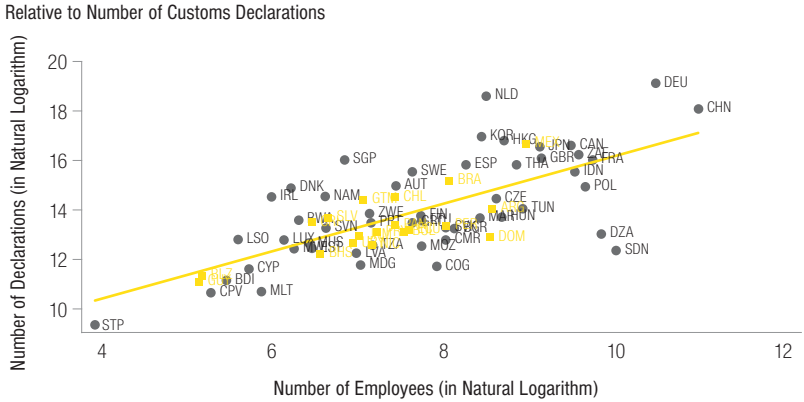
Customs agencies also differ in terms of the composition of their personnel, as captured by tenure with the agency and the academic degree of employees. Figure 1.6 shows what this composition looked like for

Figure 1.5 ■ World: Number of Employees in Customs Agencies, Number of Employees Relative to Country Population and Total Number of Processed Declarations, 2014



(continued)

Figure 1.5 ■ World: Number of Employees in Customs Agencies, Number of Employees Relative to Country Population and Total Number of Processed Declarations, 2014 (*continued*)



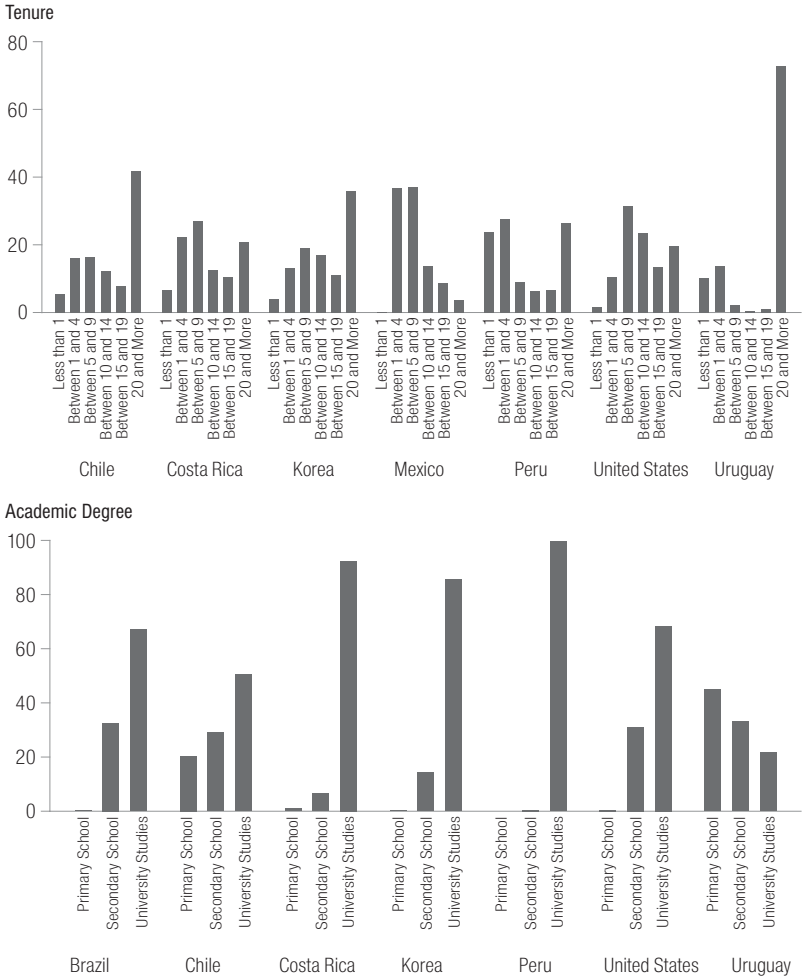
Source: Author's calculations based on data from WCO (2015).
Note: The first panel reports the median number of customs employees for different world regions. The second panel shows the actual number of customs employees for the 10 countries with the largest numbers of employees, the 10 countries with the smallest numbers of employees, and the Latin American and Caribbean countries. The third panel is a scatter plot that shows the estimated relationship of (the natural logarithm of) the number of customs employees and (the natural logarithm of) country populations. The fourth panel is a scatter plot that shows the estimated relationship of (the natural logarithm of) the total number of customs declarations and (the natural logarithm of) the number of customs employees. Latin American and Caribbean countries are colored in yellow/orange, whereas countries in the rest of the world are colored in dark gray. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

selected Latin American countries, Korea, and the United States in 2014. As for tenure, while in Chile and Uruguay more than 40 percent and 70 percent of employees have more than 20 years with the agency, respectively, in Mexico more than 70 percent of employees have been working at customs for only four years or less, which points to very high turnover. Regarding formal education, more than half of the labor force at customs agencies in the region except Uruguay has completed tertiary/university education.

1.4 Existing Border Time Measures

A number of measures have been developed to capture time spent at the border. These measures provide a first practical estimate, have broad nominal country coverage, and generally allow the evolution of time spent at the border to be tracked across the years. As such, they represent a valuable initial measurement effort. This section describes and reviews these measures.

Figure 1.6 ■ Selected Latin American Countries, Korea and the United States: Tenure and Academic Degree of Customs Employees, 2014



Source: Author's calculations based on Jordana and Volpe Martincus (2016).
Note: The upper panel reports the distribution (in percentage share) of the total number of employees across groups of employees with different tenures (as measured in years) at the agency, whereas the lower panel presents the distribution (in percentage share) of the total number of employees across groups with different (completed) academic levels.

1.4.1 Survey-based Unidimensional Measures

The single-value, country-level measure of time to trade (or its component) from the World Bank's Doing Business indicators is probably the most well-known and widely used indicator both for academic research and policy and private decision-making purposes. In particular, policymakers use these data to evaluate efficiency at the border and are judged based on them, and investors take them into account when choosing among alternative locations.

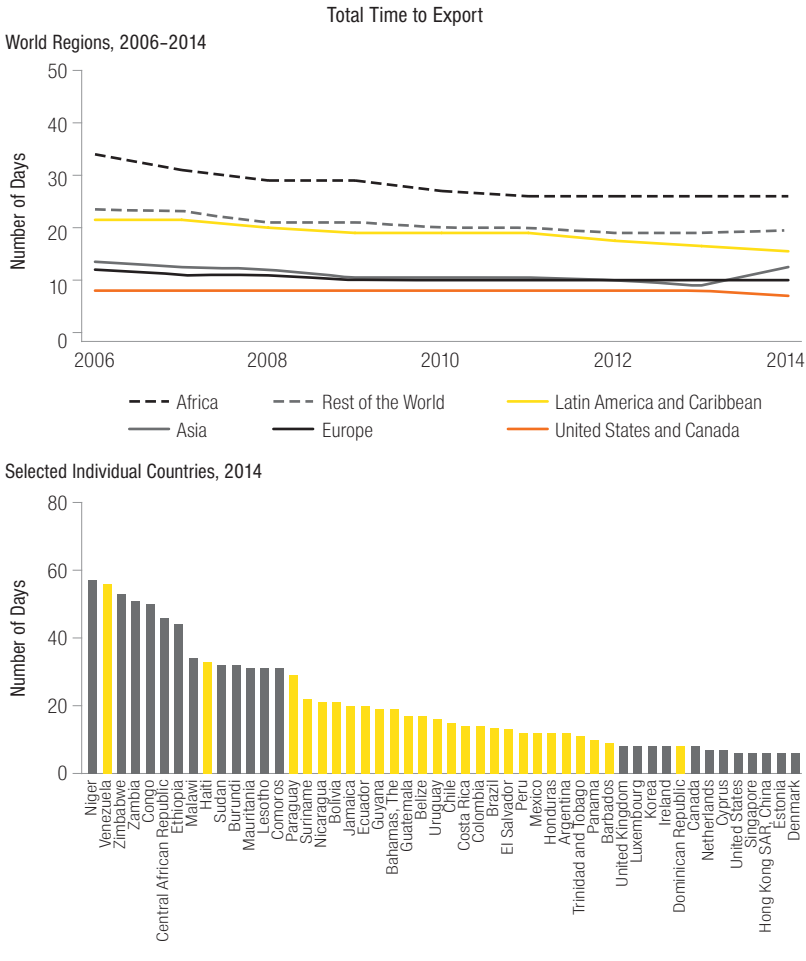
The Doing Business time-to-trade indicator is a survey-based measure. Originally, 345 freight forwarders out of the more than 40,000 operating around the world (with a minimum of two per country) reported the time required to complete four procedures: pre-shipment activities such as inspection and technical clearance, inland transportation, terminal (port) handling, and customs and technical control.[17] The survey assumed a stylized transaction with specific characteristics. Thus, for foreign sales, the exporting company was a local business, had at least 60 employees, was located in the country's most populous city, did not operate under special export regimes, and had management familiar with trading rules and requirements (i.e., sales abroad accounted for more than 10 percent of total sales).[18] Moreover, various assumptions were also made regarding the cargo. The product was transported in a dry cargo, 20-foot, full-container load, was not hazardous, and required neither refrigeration nor special phytosanitary or environmental safety standards. Given these conditions, surveyed time-to-trade measures were initially presented as to be representative for three categories of goods: textile yarns and fabrics (Standard International Trade Classification [SITC] 65), clothing accessories (SITC 84), and coffee, tea, species, and manufactures thereof (SITC 07).[19] Finally, the shipment was assumed to be ocean-transported.

[17] See Djankov, Freund, and Pham (2010).

[18] In the original version of the survey, firms were supposed to have more than 200 employees (Djankov, Freund, and Pham 2010).

[19] See Djankov, Freund, and Pham (2010). A few years ago a first revision of the Doing Business indicators was launched. At that stage, the survey asked respondents to focus on a leading export product in the country that met these requirements, although this product was not identified along with the public data. More specifically, "…the product must not be hazardous, require refrigeration, or be used for military purposes. It is... exported in a dry-cargo, 20 ft. full container load (FCL), weighs 10 tons and is valued

Figure 1.7 ■ World: Total Time to Export and Total Time to Import according to the Old Doing Business Methodology, 2006–2014 and 2014

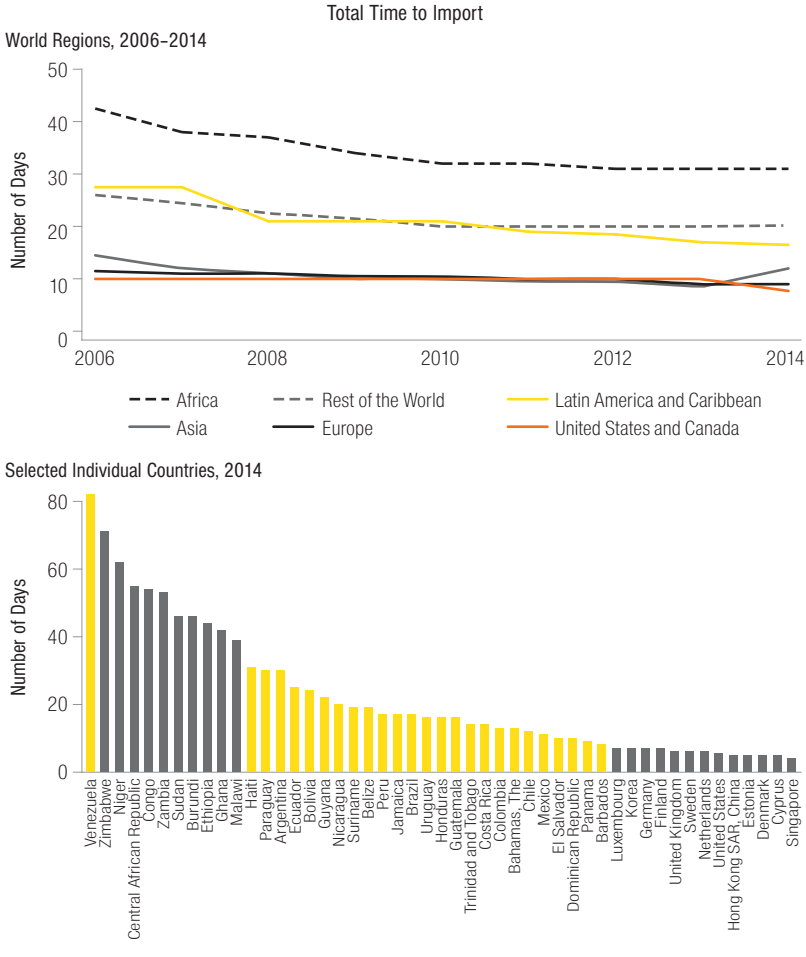


(continued)

Figure 1.7 shows the evolution of the median total time to both export and import across different world regions and the relative position of Latin American and Caribbean countries according to the Doing Business indicators' original methodology in the most recent available

at US$20,000. The product had to be one of your country's leading exports…." This changed with the current version of the indicators.

Figure 1.7 ■ World: Total Time to Export and Total Time to Import according to the Old Doing Business Methodology, 2006–2014 and 2014 (*continued*)



Source: Author's calculations based on the World Bank's Doing Business (2006–2014).
Note: The first panel reports the median number of days to export for different world regions, whereas the third panel presents the median number of days to import for the same regions over 2006–2014. The second and fourth panels show shows the respective individual data for the 10 countries with the longest time to export/import, the 10 countries with the shortest time to export/import, and the Latin American and Caribbean countries for 2014. The latter are colored in yellow, whereas countries in the rest of the world are colored in dark gray. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

year. The world median (mean) total number of days to export declined from 23 (27.8) to 18 (21.7) between 2006 and 2014. The reduction was more pronounced in Latin America and the Caribbean, where the time fell from 21.8 to 15.5 days. Nevertheless, by the end of the period, it was still clearly above median total times in Asia, Europe, and North America, where median times were 12.5, 10, and 7 days, respectively. Figures for imports were slightly higher, but trends are similar. In median terms, it took 16.5 days to import into Latin America and the Caribbean in 2014, but only 12 days into Asia, 9 days into Europe, and 7.7 days into North America. In the region, longer times to trade were observed in Venezuela, Haiti, Paraguay, and Bolivia, and shorter times were reported in Barbados, Dominican Republic, and Panama.

The Doing Business indicators recently underwent a methodological revision. In the new version, times for three different procedures are surveyed: domestic transportation, documentary compliance, and border compliance. The latter two are more specific and relevant for measuring time associated with border crossings. Time for documentary compliance captures the time associated with compliance with documentary requirements of all government agencies of the origin country, the destination country, and any transit country. It specifically includes the time for obtaining, preparing, processing, presenting, and submitting documents. Time for border compliance corresponds to the time associated with compliance with customs procedures and other regulations (in the domestic economy but not in the partner) as well as that for port or border handling. It therefore encompasses the time for obtaining, preparing, and submitting documents during port or border handling, customs clearance, and inspection procedures.

Furthermore, the standardized case study on which the data gathering is based now has a different set of assumptions. More precisely, each economy is assumed to import a shipment of 15 metric tons of containerized auto parts from the main importing partner (i.e., the economy from which it imports the largest value of these goods) and export the product (containerized or not) with the largest foreign sale to its main export partner (i.e., the economy that is the largest purchaser of this product), as determined based on UN COMTRADE data, and through the most widely used mode of transportation.[20]

[20] Moreover, the unit of trade is assumed to be the shipment and products are new. For further details on the survey assumptions see World Bank (2016).

Figure 1.8 presents these new indicators (time for documentary and border compliance) in decreasing order of the number of days to export (first and third panels) and import (second and fourth panels), both in terms of regional medians (first to fourth panels) and for individual countries (fifth and sixth panels).[21] These time measures are substantially lower than those based on the old methodology. Compliance with documentary requirements and border processing each take between two and three days in Latin America and the Caribbean, which is shorter than in Africa (about five days each) but substantially longer than in Asia and especially in Europe and North America (less than one day each). Therefore, the regional rankings are preserved under the new methodology. In Latin America and the Caribbean, times are shortest in the Dominican Republic, Mexico, and Panama. Long times are reported in Venezuela and, relatively, in Bolivia, Guyana, and, for imports, in Argentina and Brazil.

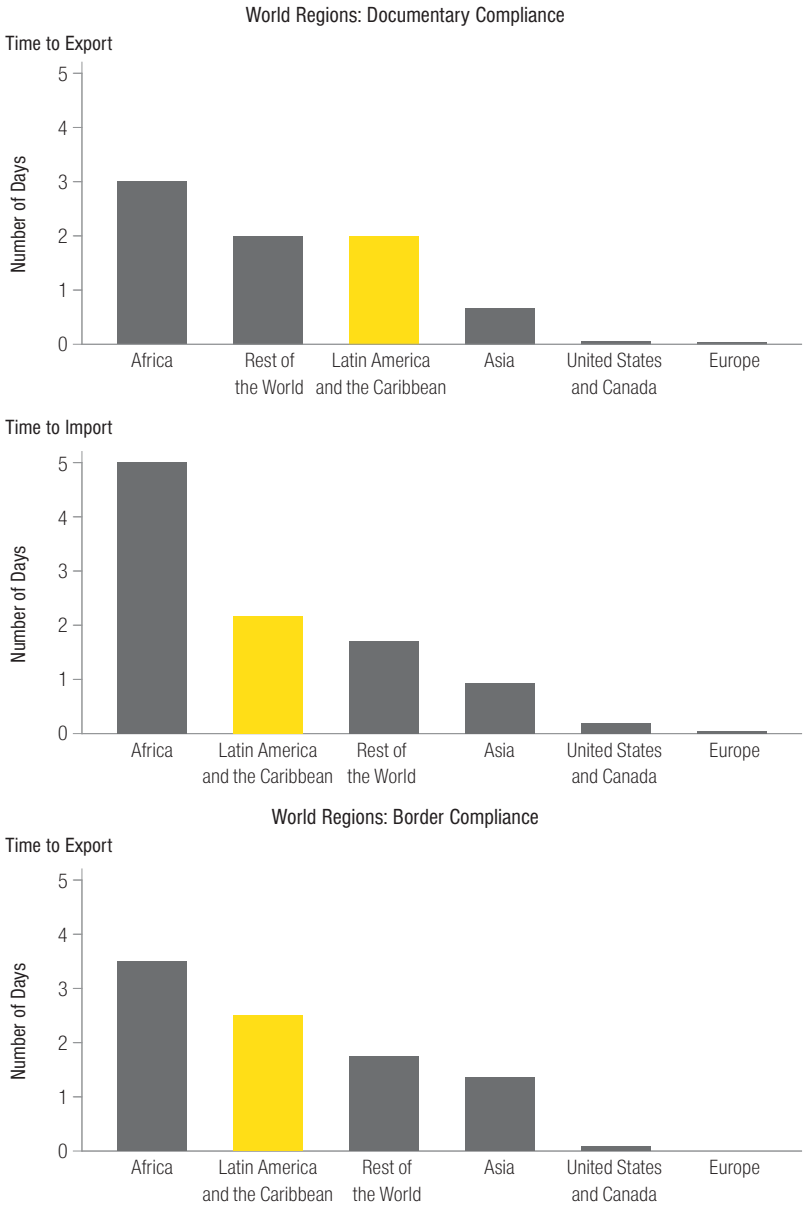
Another well-known border time measure is provided by the World Bank's Logistic Performance Index (LPI). Like the Doing Business indicators, the LPI is a survey-based measure. In its most recent edition, 1,051 multinational freight forwarders and express carriers completed the online survey to produce country assessments covering more than 100 economies.[22] The survey asks these logistic professionals to also report the time spent at different steps of the supply chain, namely, the time from the seller's factory (typically the capital or the country's largest commercial city) to the port/airport (sea/air) or buyer's warehouse (land) (exports) and vice versa (imports), and customs clearance times, both in the absence of and under physical inspection, along with the respective share of shipments subject to that inspection.[23] Data for customs times, which more closely correspond to a component of the time spent at the border, are shown in Figure 1.9 both in terms of regional medians and the cross-country distribution for the most recent year. The figure reveals that time to clear customs in Latin America and the Caribbean is particularly long relative to other regions when shipments are subject to physical inspections, but is comparable to the times of the more developed regions in the absence of such inspections. This is especially the case with Bolivia, Haiti, and Trinidad and Tobago.

[21] Measures are now also available in hours.

[22] See Arvis, Saslavsky, Ojala, Shepherd, Busch, and Raj (2016).

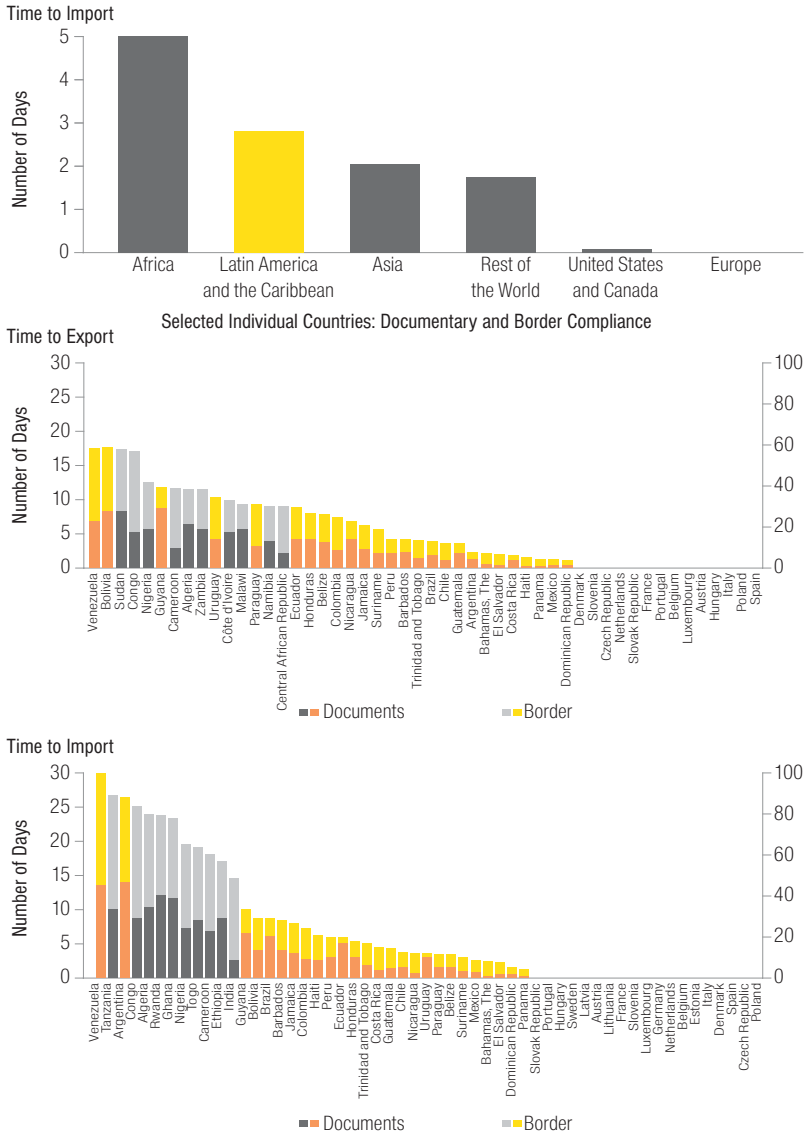
[23] See Chapter 2 on customs physical inspection.

Figure 1.8 ■ World: Time to Export and Time to Import according to the New Doing Business Methodology, 2016



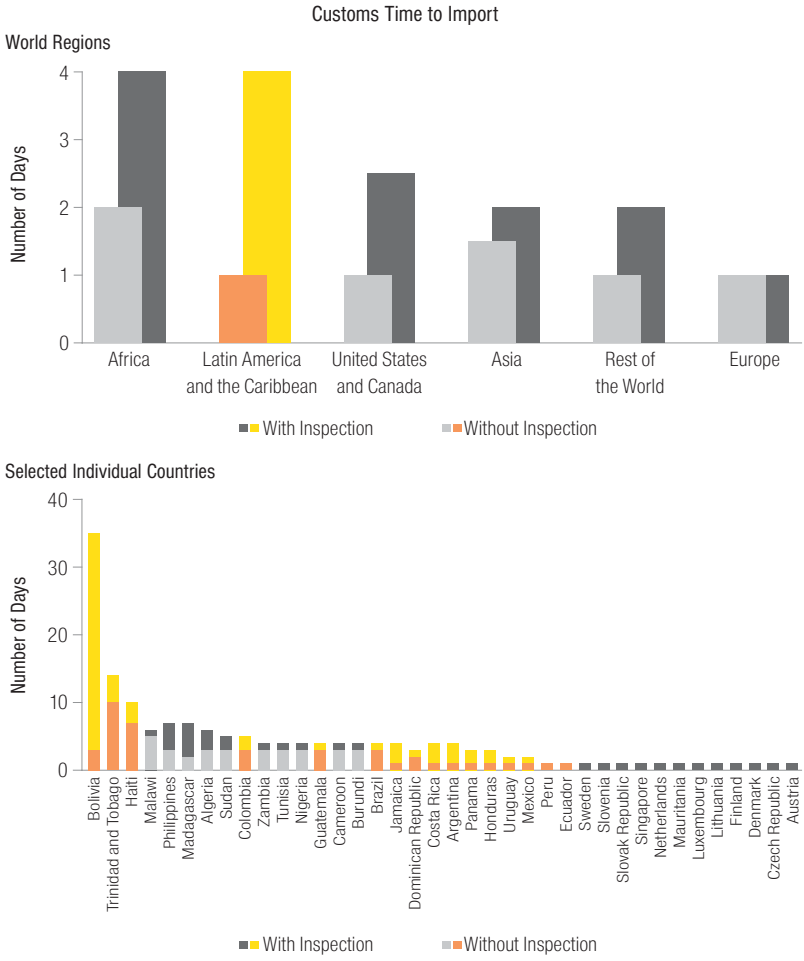
(continued)

Figure 1.8 ■ World: Time to Export and Time to Import according to the New Doing Business Methodology, 2016 (*continued*)



Source: Author's calculations based on data from the World Bank Doing Business (2016).
Note: The first and third panels report the median number of days to comply with export documentary requirements and border regulations for different world regions, whereas the second and fourth panels present the median number of days to import for the same regions. The fifth and sixth panel shows the respective individual data for the 10 countries with the longest time to export/import, the 10 countries with the shortest time to export/import, and the Latin American and Caribbean countries. The latter are colored in yellow/orange, whereas countries in the rest of the world are colored in dark gray. The number of days for Venezuela in the fifth and sixth panels is measured on the right y axis. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

Figure 1.9 ■ World: Customs Time to Import and Percentage Share of Shipments Inspected according to the Logistic Performance Index, 2016



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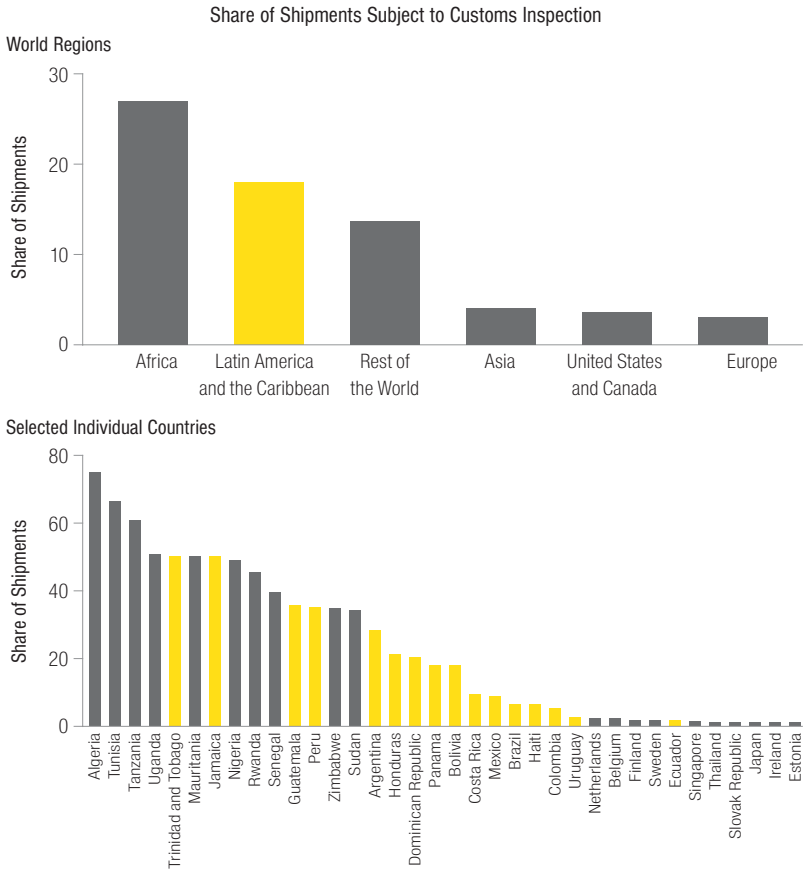
According to the LPI, Africa has the largest percentage share of import shipments that are intrusively examined. In countries such as the Algeria, Tunisia, and Tanzania, this share exceeds 60 percent. With almost 20 percent, Latin America and the Caribbean ranks second in terms of the intensity of physical inspections of import shipments. The

Figure 1.9 ■ World: Customs Time to Import and Percentage Share of Shipments Inspected according to the Logistic Performance Index, 2016 (*continued*)



Source: Author's calculations based on data from the World Bank's Logistic Performance Index, 2016.
Note: The first panel reports the median number of days to clear customs, both for imports subject to physical inspection and for imports not undergoing this inspection for different world regions. The third panel presents the median percentage share of shipments subject to physical inspection for the same regions. The second and fourth panels show the respective individual data for the 10 countries with the longest customs clearance time to import/highest inspection shares, the 10 countries with the shortest clearance time to import/lowest inspection shares, and the Latin American and Caribbean countries. The latter are colored in yellow/orange, whereas countries in the rest of the world are colored in dark gray. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

percentage share is relatively high in Jamaica, Guatemala, and Peru, where it is above 35 percent, and relatively low in Ecuador and Uruguay, where it does not reach 2 percent.

1.4.2 Survey-based Distributional Measures

Both the Doing Business and the LPI indicators are primarily single-value, average-type of measures of border times. The truth is, however, that the actual distribution of border times is far from constant across trade flows. In fact, border times vary substantially across trade flows for given countries in a given year. Survey-based data from the World Bank's Enterprise Surveys provide a first approximation to such heterogeneity on the export side. Specifically, this dataset primarily reports the average number of days between the time when an establishment's goods arrive at their main point of exit (e.g., port, airport) and the time when these goods clear customs. Hence, this is a firm-level, customs-specific measure of border times. Figure 1.10 presents the regional medians as computed from medians at the country level (upper panel) and these national medians (lower panel) for comparison purposes. Figure 1.11 displays the firm-level distributions for selected economies for the most recent available year.[24] According to the Enterprise Surveys, it took around five days to export from Latin America and the Caribbean in median terms, which is substantially longer than in the rest of the world and even longer than in Europe (Figure 1.10).[25] Individual country histograms reveal that there are significant differences across firms within countries. With the exception of Ecuador, exports from most firms clear customs in relatively few days, but some exports can spend more than 20 days in customs (Figure 1.11).

1.4.3 Summing Up

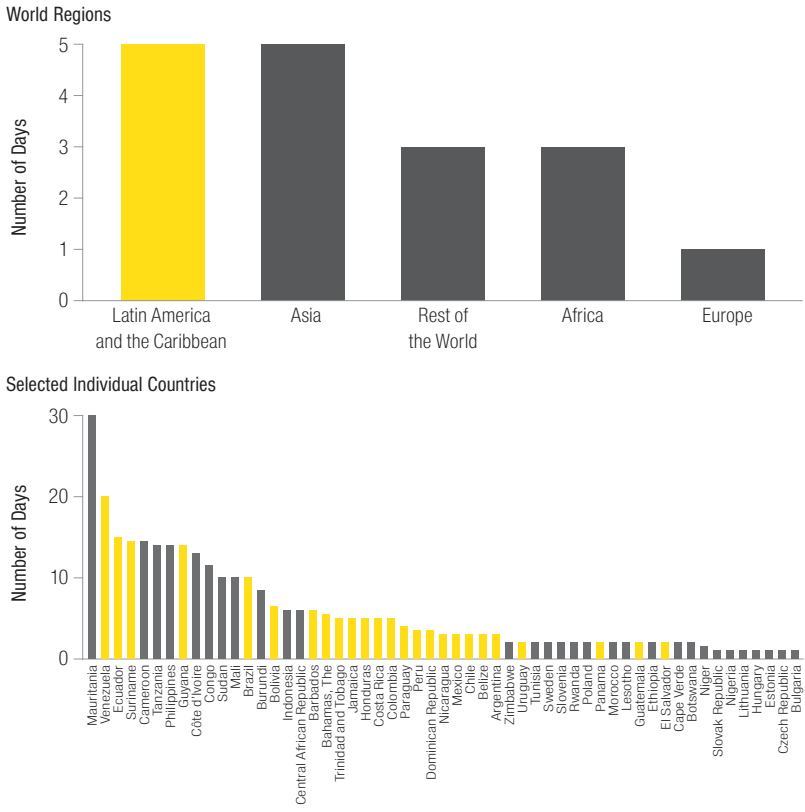
Table 1.2 presents a snapshot of the existing border time measures for Latin American and Caribbean countries and regional medians in the most recent years. Figure 1.12 shows both simple and rank correlations among them, both for all countries and for countries in the region.[26] Two facts emerge from these data. First, while admittedly some of them may capture times

[24] Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, and Uruguay have been selected because transaction-level data on customs clearance times are also available for these countries, which makes it possible to explicitly compare the Enterprise Surveys-based distributions with the respective actual distribution from customs data (see Section 1.4).

[25] The Asian median seems to be strongly influenced by the survey's country coverage. Economies such as Japan and Korea are not included.

[26] Correlation patterns are very similar when a common year (2010) is used.

Figure 1.10 ■ World: Customs Time to Export according to the Enterprise Surveys, 2010



Source: Author's calculations based on data from World Bank Enterprise Surveys (2010–2016).
Note: The upper panel reports the median number of days to clear customs for different world regions, whereas the lower panel shows the respective individual data for the 10 countries with the longest customs clearance time to export, the 10 countries with the shortest clearance time to export, and the Latin American and Caribbean countries. The latter are colored in yellow, whereas countries in the rest of the world are colored in dark gray. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

associated with different border procedures, there are evident differences between these measures. The correlation between them is accordingly far from perfect. The simple pairwise correlation between the customs import times of the Logistic Performance Index and the import border times as measured using the new Doing Business methodology, which are supposed to be conceptually closest, does not reach 0.4. Similarly, the correlation between the median customs export time according to the

Figure 1.11 ■ Selected Latin American Countries: Distribution of Customs Times to Export across Firms according to the Enterprise Surveys, 2010

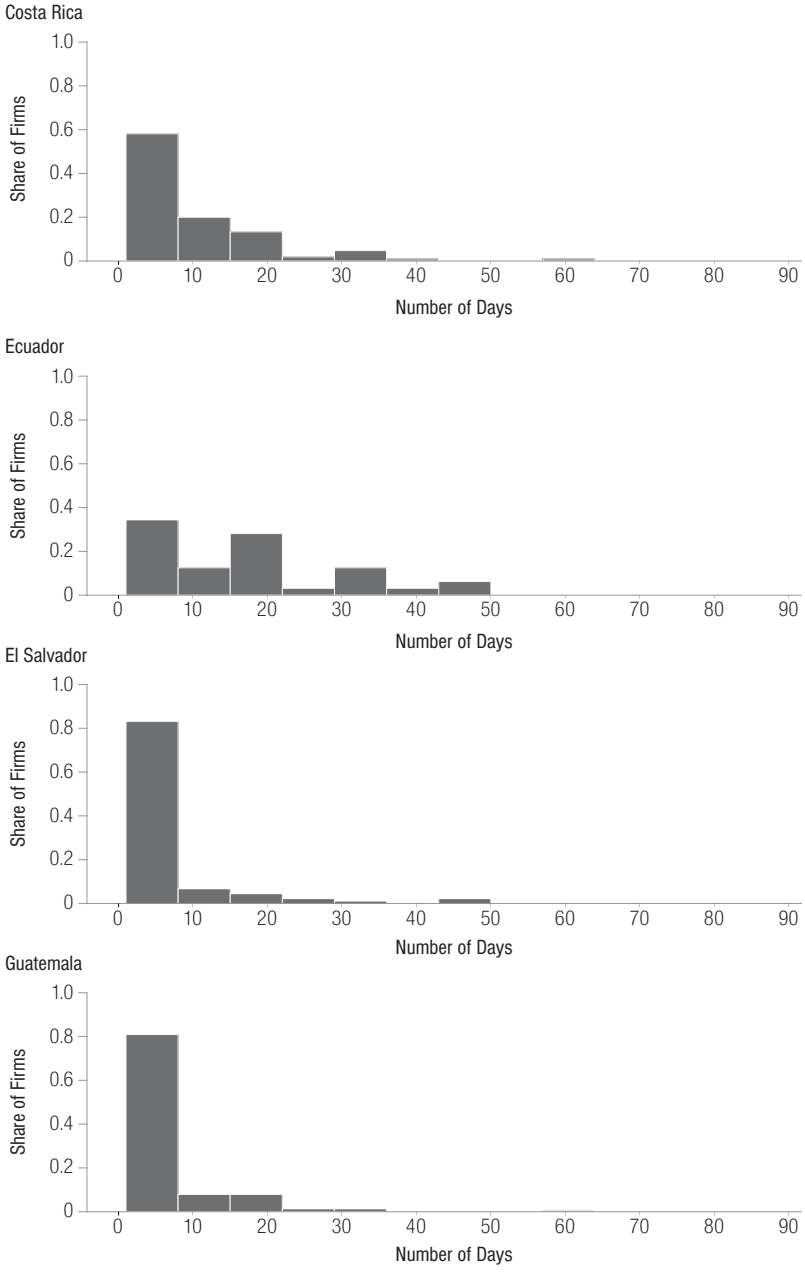


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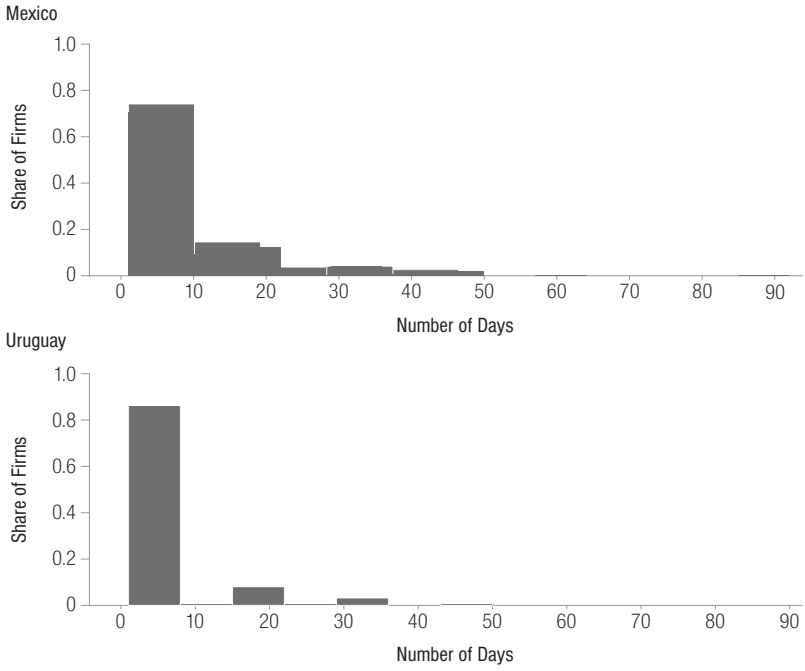
Figure 1.11 ■ Selected Latin American Countries: Distribution of Customs Times to Export across Firms according to the Enterprise Surveys, 2010 (*continued*)



Source: Author's calculations based on data from World Bank Enterprise Surveys (2010–2016).
Note: The panels are histograms that show the distribution of the number of days that firms' exports need to clear customs for selected countries. The x axis reports number of days, whereas the y axis shows the respective share of firms.

Enterprise Surveys and the export border time based on the new Doing Business methodology is only slightly above this.[27] In the same vein, the rank correlation between Logistic Performance Index's customs import time and the new Doing Business methodology's import documentary time is higher than the rank correlation between the Logistic Performance Index's time and the new Doing Business methodology's import border time. Second, the correlations are substantially weaker for Latin American and Caribbean countries. In particular, some are not even statistically distinguishable

[27] Simple pairwise correlations would be expected to be high when indicators supposedly measure the same time. In fact, in these cases, measures should be theoretically identical and the correlation should accordingly be equal to one. For other pairs of indicators, the rank correlation could be expected to be high given their (at least partial) common components.

Table 1.2 ■ World Regions and Latin American and Caribbean Countries: Existing Border Times, Most Recent Available Year

Country/Region	Doing Business								Logistic Performance Index		Enterprise Survey
	Old Methodology		New Methodology						M		X
	X	M	X			M			Customs		Customs
	All Procedures		DOC	BOR	T	DOC	BOR	T	NO-I	I	
Argentina	12.0	30.0	1.3	0.9	2.1	14.0	12.5	26.5	3.0	4.0	3.0
Bahamas	19.0	13.0	0.5	1.5	2.0	0.3	2.1	2.4	1.0	3.0	
Barbados	9.0	8.0	2.3	1.7	4.0	4.1	4.3	8.4			6.0
Belize	17.0	19.0	3.6	4.0	7.6	1.5	2.0	3.5			3.0
Bolivia	21.0	24.0	8.0	9.0	17.0	4.0	4.8	8.8	2.0	4.0	6.5
Brazil	13.4	17.0	1.8	2.0	3.8	6.1	2.6	8.7	5.0	8.0	10.0
Chile	15.0	12.0	1.0	2.5	3.5	1.5	2.3	3.8	1.0	1.0	3.0
Colombia	14.0	13.0	2.5	4.7	7.2	2.7	4.7	7.3	1.0	2.0	5.0
Costa Rica	14.0	14.0	1.0	0.8	1.8	1.1	3.3	4.4	1.0	2.0	
Dominican Republic	8.0	10.0	0.4	0.7	1.1	0.6	1.0	1.6	1.0	2.0	
Ecuador	20.0	25.0	4.0	4.5	8.5	5.0	1.0	6.0	2.0	5.0	15.0
El Salvador	13.0	10.0	0.4	1.6	2.0	0.5	1.7	2.2		2.0	
Guatemala	17.0	16.0	2.0	1.5	3.5	1.3	3.0	4.3	1.0	3.0	2.0
Guyana	19.0	22.0	8.3	3.0	11.3	6.5	3.5	10.0			14.0
Haiti	33.0	31.0	0.2	1.3	1.4	2.5	3.8	6.3	10.0	1.0	
Honduras	12.0	16.0	4.0	3.7	7.7	3.0	2.3	5.3	2.0	4.0	5.0
Jamaica	20.0	17.0	2.6	3.4	6.0	3.6	4.4	8.0	3.0	3.0	5.0

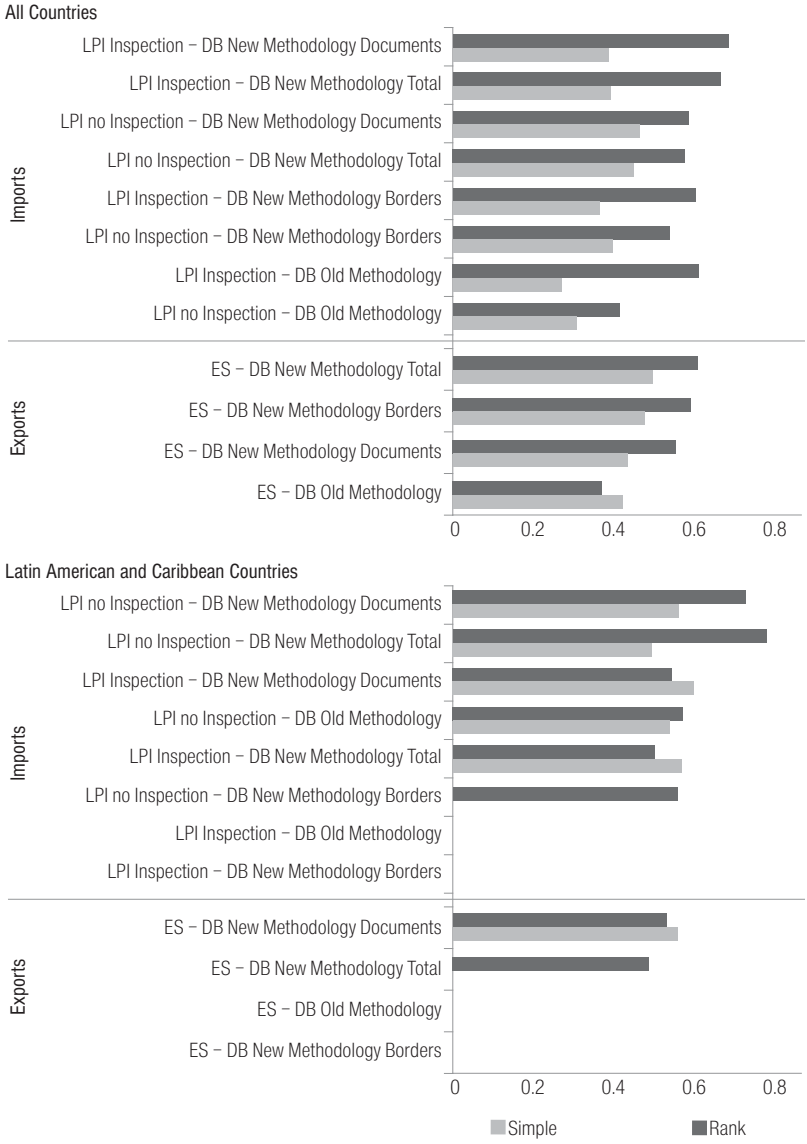
(continued)

Table 1.2 ■ World Regions and Latin American and Caribbean Countries: Existing Border Times, Most Recent Available Year (*continued*)

Country/Region	Doing Business								Logistic Performance Index		Enterprise Survey
	Old Methodology		New Methodology						M		X
	X	M	X			M			Customs		Customs
	All Procedures		DOC	BOR	T	DOC	BOR	T	NO-I	I	
Mexico	12.0	11.2	0.3	0.8	1.2	0.8	1.8	2.6	1.0	2.0	3.0
Nicaragua									1.0	4.0	3.0
Panama	10.0	9.0	0.3	1.0	1.3	0.3	1.0	1.3	1.0	2.0	2.0
Paraguay	29.0	30.0	3.0	6.0	9.0	1.5	2.0	3.5	2.0	3.0	4.0
Peru	12.0	17.0	2.0	2.0	4.0	3.0	3.0	6.0	1.0	3.0	3.5
Trinidad and Tobago	11.0	14.0	1.3	2.5	3.8	1.8	3.3	5.1			
Uruguay	16.0	16.0	4.0	6.0	10.0	3.0	0.5	3.5	1.0	3.0	2.0
Latin America and the Caribbean	14.0	16.0	2.0	2.0	3.8	2.5	2.6	5.1	1.0	4.0	4.0
Africa	25.0	31.0	3.0	3.2	7.0	3.9	4.3	8.7	2.0	4.0	2.0
Asia	14.0	13.0	0.9	1.6	2.1	1.7	2.1	3.7	2.0	2.0	10.0
Europe	10.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0
North America	7.0	7.7	0.1	0.1	0.1	0.2	0.1	0.3	1.0	2.5	
Rest of the World	20.0	21.0	2.0	1.6	3.8	1.7	1.5	4.5	1.0	2.0	3.0

Source: Author's calculations based on data from the World Bank's Doing Business Project, Logistic Performance Index, and Enterprise Surveys.
Note: The table reports alternative border time measures (in days) for individual Latin American and Caribbean countries and their medians for different world regions. Data may correspond to slightly different years (e.g., figures from the old Doing Business methodology are for 2014, whereas those from the new Doing Business methodology are for 2015). X: Exports; M: Imports; DOC: Documentary Compliance; BOR: Border Compliance; T: Total, Documentary and Border Compliance; I: Inspection; NO-I: No inspection. See footnote 13 for the countries that constitute each region and the set from which included individual economies are selected.

Figure 1.12 ■ World and Latin America and the Caribbean: Simple and Rank Correlation among Border Time Measures, Most Recent Available Year



Source: Author's calculations based on data from the World Bank's Doing Business (DB) indicators, Logistic Performance Index (LPI), and Enterprise Surveys (ES).
Note: The figure reports the pairwise simple and rank correlations between the DB, LPI, and ES border time measures. Data may correspond to slightly different years (e.g., DB old methodology figures are for 2014, whereas DB new methodology figures are for 2015): Estimated correlations that are not statistically significantly different from zero at the 10 percent level are reported as zero.

from zero. Interestingly, this is the case with Logistic Performance Index's customs import time and the median Enterprise Surveys' customs export time with the new Doing Business methodology's import and export border times, respectively. Overall, further clarification and cross-check consistency would be desirable to interpret and utilize these useful measures in the proper way.[28]

These survey-based or personal-assessment-based indicators are certainly useful as a first approximation. However, they have shortcomings that are related, first, to the coverage and the underlying assumptions of the surveys, which in turn echo in their precision.

Data from Uruguay are illustrative in this regard. Whereas firms matching the firm assumed by the original Doing Business survey could a priori jointly account for a substantial portion of a country's total exports, these may only be a small share of the entire population. According to data from Uruguay's tax agency (*Dirección General Impositiva* – DGI), there are only around 200 medium-to-large-size companies (i.e., companies with more than 20 employees) in tradable sectors in Montevideo, which amounts to roughly 10 percent of the total number of firms registering exports each year in Uruguay. Furthermore, initial reference product categories—i.e., textile yarns and fabrics, clothing accessories, and coffee, tea, species and manufactures thereof—jointly accounted in 2011 for only 4.2 percent of Uruguay's total exports and 12.1 percent of Uruguay's total number of exporting companies. Moreover, maritime transport represented around 60 percent of total exports and less than 50 percent of the total number of export transactions between 2002 and 2011. Overall, over this period, relatively few firms were located in Montevideo, had more than 60 employees, and shipped the aforementioned products abroad by ocean, and together they accounted for a small share of Uruguay's total number of exporters. This hardly makes them representative of the universe of companies as a whole.

According to the new Doing Business methodological approach and based on trade data spanning the five most recent years (2011–2015), exports of meat and edible meat to the Russian Federation through the Port of Montevideo and imports of parts and accessories of motor vehicles from Brazil through the Rio Branco border crossing are the reference

[28] See Hallward-Driemeier and Pritchett (2015) for a systematic comparative analysis of the Doing Business and Enterprise Surveys measures.

export and import for border time measurement purposes.[29] The former accounted for 2 percent of the total export value, 1.5 percent of the total number of exporting firms, and 1.8 percent of the total number of export transactions, whereas the latter represented only 0.1 percent of the total import value, 0.2 percent of the total number of importing firms, and 0.1 percent of the total number of import transactions.

A second limitation, which primarily concerns the Doing Business and Logistic Performance Index measures, is that relevant heterogeneities are left entirely out of the picture. This matters because, as shown below, border times can be substantial and highly variable, thus significantly affecting delivery dates and, as a consequence, buying and selling decisions and in turn firms' trade outcomes.

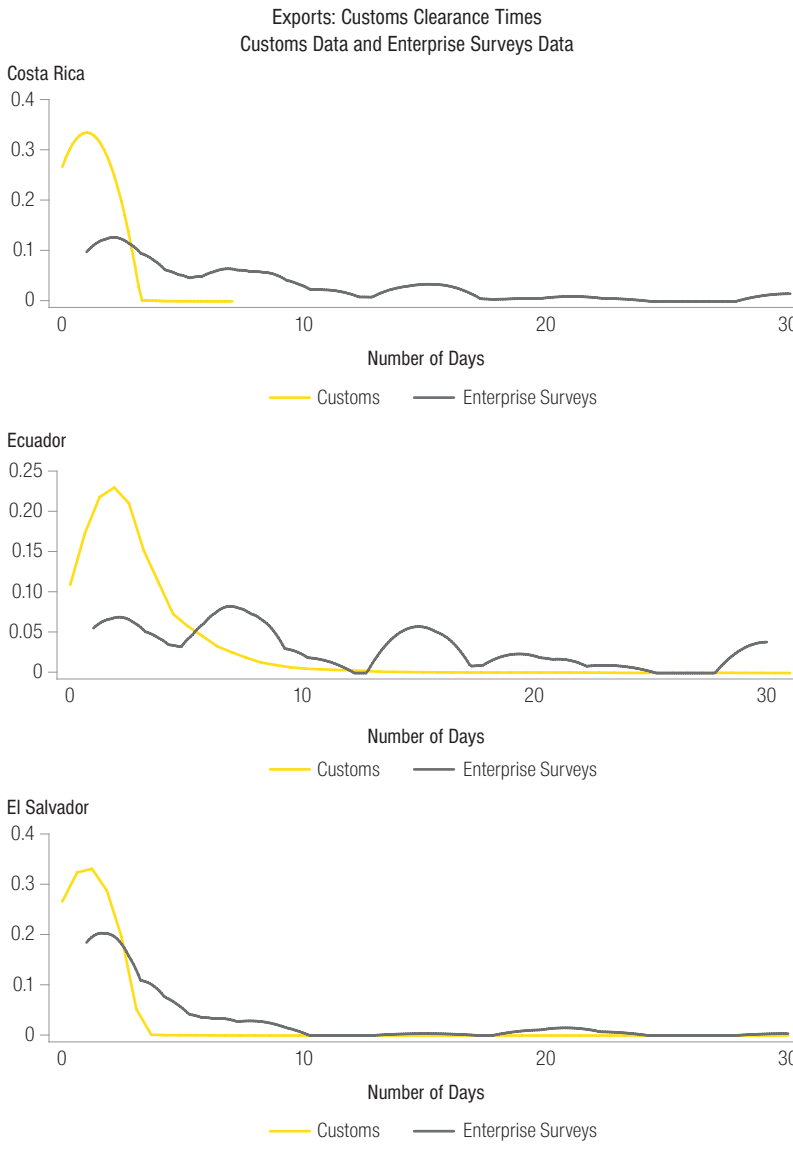
1.5 A Way Forward: Transaction-level, Step-specific Time Measures Based on Customs Data

After leaving the origin country, imports have to be internationally shipped, arrive at the destination port, and be unloaded, moved to customs, inspected, cleared, and finally picked up. Thus, even once at the border, importing involves various steps and diverse actors. Some of these steps are due to the actual processing of the imports by port workers, shipping agents, and government officials. Other steps are due to storage between steps and preparation for customs and delivery. These other steps depend on firms' management of the supply chain in general and their management of the port of entry in particular.

Customs and other border agencies in several countries around the world systematically collect highly detailed, transaction-specific information, including when each of these procedures starts and ends, thus allowing a thorough and accurate characterization of border times for all of an economy's shipments. By going beyond constants and samples, this clearly allows improvements to the measurement and understanding of the components, drivers, and economic effects of border times.

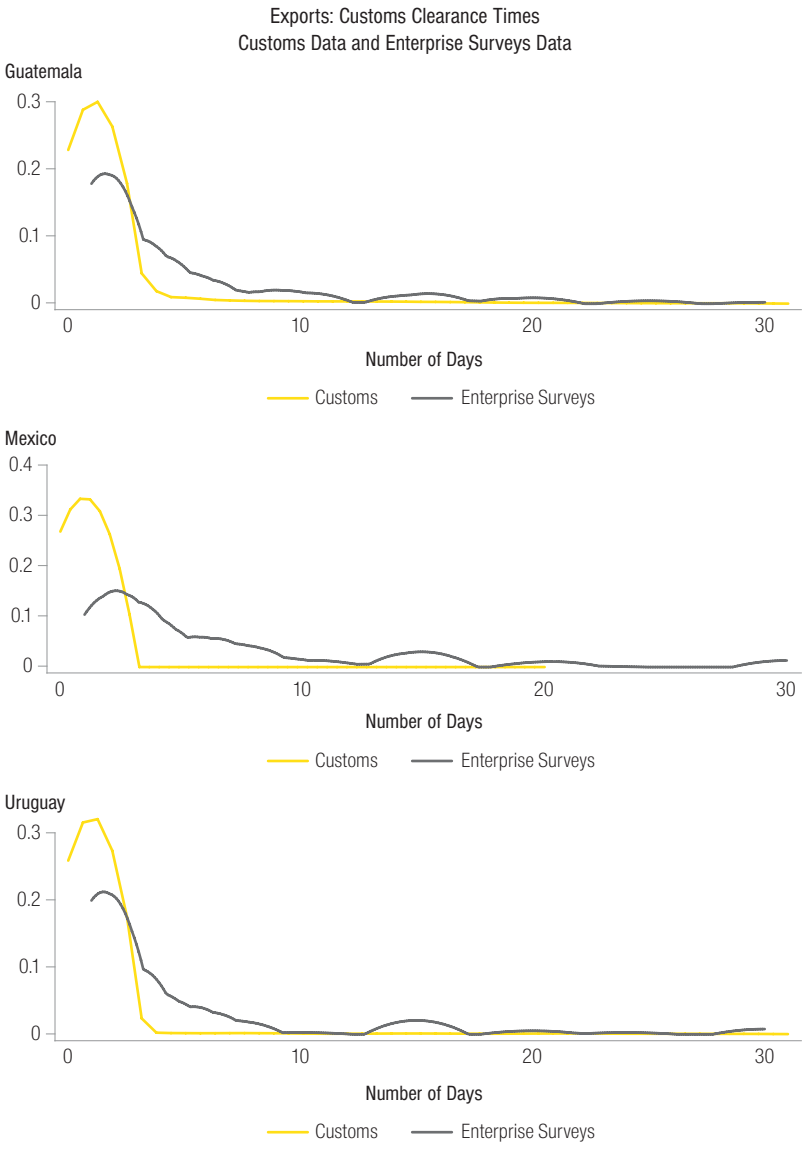
[29] These reference products, partners, and border crossings have been taken from the World Bank's Doing Business indicators website.

Figure 1.13 ■ Selected Latin American Countries: Enterprise Surveys and Logistic Performance Index versus Customs Data, 2010



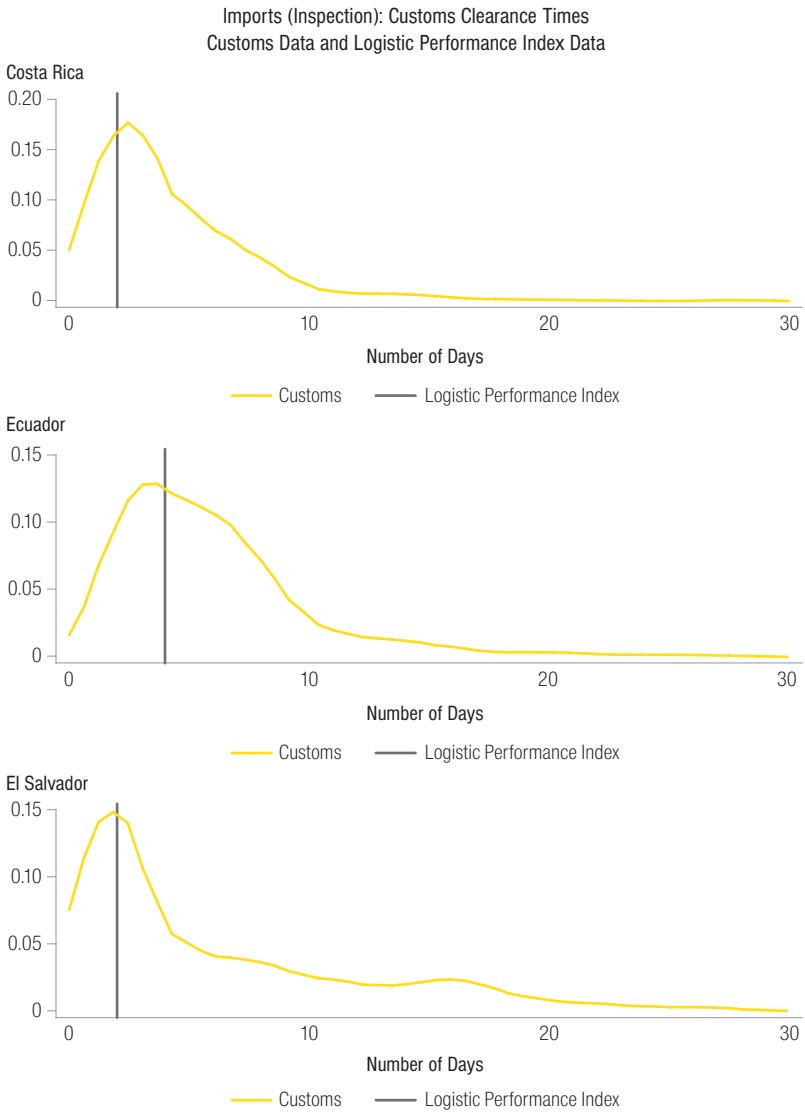
(continued)

Figure 1.13 ■ Selected Latin American Countries: Enterprise Surveys and Logistic Performance Index versus Customs Data, 2010 (*continued*)



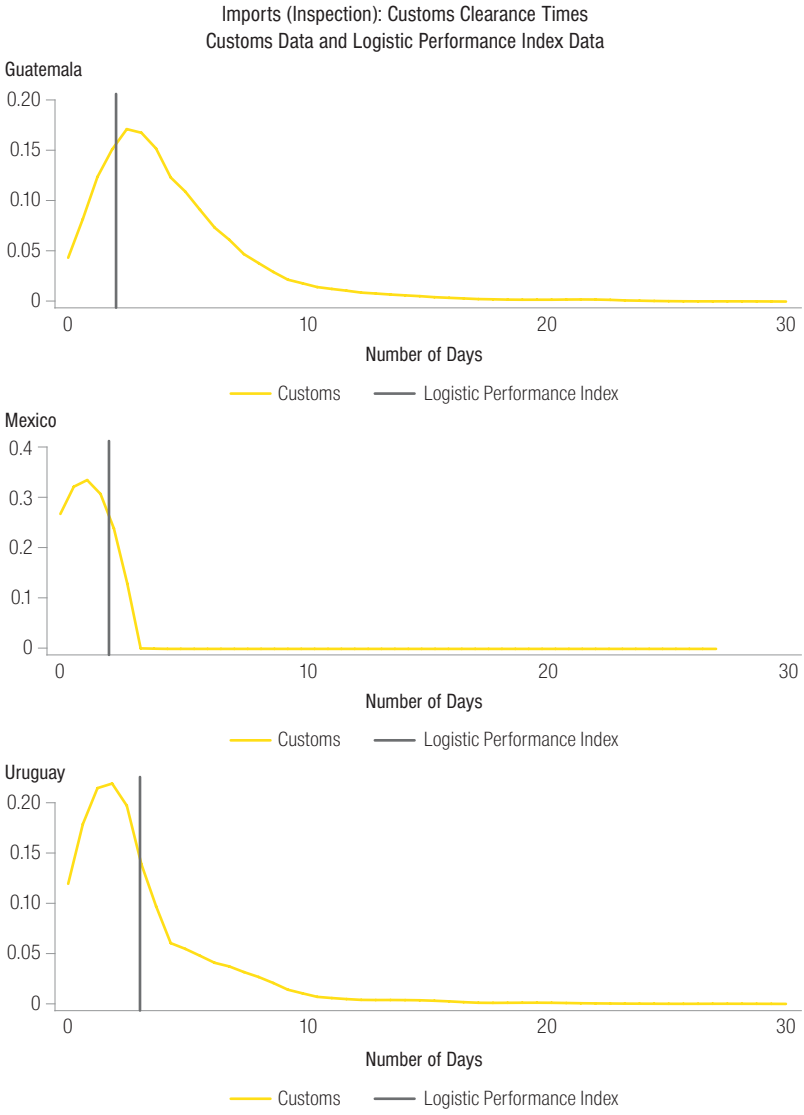
(continued)

Figure 1.13 ■ Selected Latin American Countries: Enterprise Surveys and Logistic Performance Index versus Customs Data, 2010 (*continued*)



(continued)

Figure 1.13 ■ Selected Latin American Countries: Enterprise Surveys and Logistic Performance Index versus Customs Data, 2010 (*continued*)



Source: Author's calculations based on data from national customs agencies (DGA – Costa Rica, SENAE – Ecuador, DGA – El Salvador, SAT – Guatemala, SAT – Mexico, DNA – Uruguay) and World Bank's Enterprise Surveys and Logistic Performance Index (2010–2016).
Note: The panels in the upper part compare the distribution of the number of days to clear customs for exports based on transaction-level customs data and the counterpart based on the Enterprise Surveys data Latin American countries. The panel in the lower part present the distribution of the time to clear customs for imports subject to physical inspection based on transaction-level customs data along with the single value reported by the Logistic Performance Index. The x axis reports the number of days at customs, whereas the y axis shows the fraction of shipments.

The upper part of Figure 1.13 compares the distribution of the number of days to clear customs for exports based on transaction-level customs data and the counterpart based on Enterprise Surveys data for selected Latin American countries.[30] In all cases, the distributions are significantly different from each other from a statistical point of view. In particular, the distributions based on the Enterprise Surveys data are shifted to the right relative to the distributions based on the customs data.[31] More specifically, the Enterprise Surveys distributions tend to underrepresent short clearance times and overrepresent long clearance times.[32]

The lower part of Figure 1.13 presents the distribution of the time to clear customs for imports subject to physical inspection based on customs data along with the single value reported by the Logistic Performance Index. In addition to highlighting the existence of an important heterogeneity across import flows that, unfortunately, unidimensional indicators such as Logistic Performance Index cannot reflect, the figure raises the question of what moment or summary measure (i.e., attribute) of the actual underlying distribution this indicator might be capturing. Thus, for instance, the figure might visually suggest that the Logistic Performance Index essentially corresponds to the mode of the distribution of the time to clear customs for imports. However, the Logistic Performance Index measure differs from the mode in all but one country, with the difference being generally one day.

It might still be the case that indicators such as the Logistic Performance correctly rank countries in terms of the aforementioned times, in which case they could be perfectly used as ordinal measures. This potential rank-preserving property does not seem to hold "locally," i.e., for the sample of Latin American countries considered here. Regardless of whether the mean, the median, or the mode are used to summarize the distribution of actual customs times, rankings based on these measures do not perfectly match those based on the Logistic Performance Index. It should be acknowledged, though, that the previous exercise is limited and at best merely indicative due

[30] The figure presents kernel density estimates based on the Epanechnikov kernel.

[31] A Kolmogorov-Smirnov test is computed to test the null hypothesis that the data come from the same distributions. Patterns and differences are the same if, instead, transaction-level customs time data are aggregated at the firm level through the median or the mean, in which case Enterprise Surveys and customs data are at the exact same level of aggregation.

[32] Results from the procedure proposed by Delgado, Fariñas, and Ruano (2002) suggest that the distributions based on the Enterprise Surveys stochastically dominate their peers based on customs data.

to the small sample size. A proper assessment of this possible rank-matching property would require summary measures computed from transaction-level data for a large sample of countries. Such an assessment is worth carrying out as these measures become more available for more economies.

The next section shows that consistently using these transaction-level, stage-specific data for both academic research and policymaking purposes can make a difference.

1.6 Case Study: Importing into Peru[33]

1.6.1 The Import Process

Importing involves various steps (Figure 1.14). After arrival at the port, the ship has to be unloaded by the port operators. Unloaded shipments can then be held in shipyards or warehouses while firms review them and prepare customs documents. Once ready, an electronic Single Customs Document (*Declaración Única de Aduanas* – DUA) is completed and sent to customs, which validates the DUA, sends back a message containing the number assigned to the DUA and the date, and assigns the associated tax and customs payments that are due.

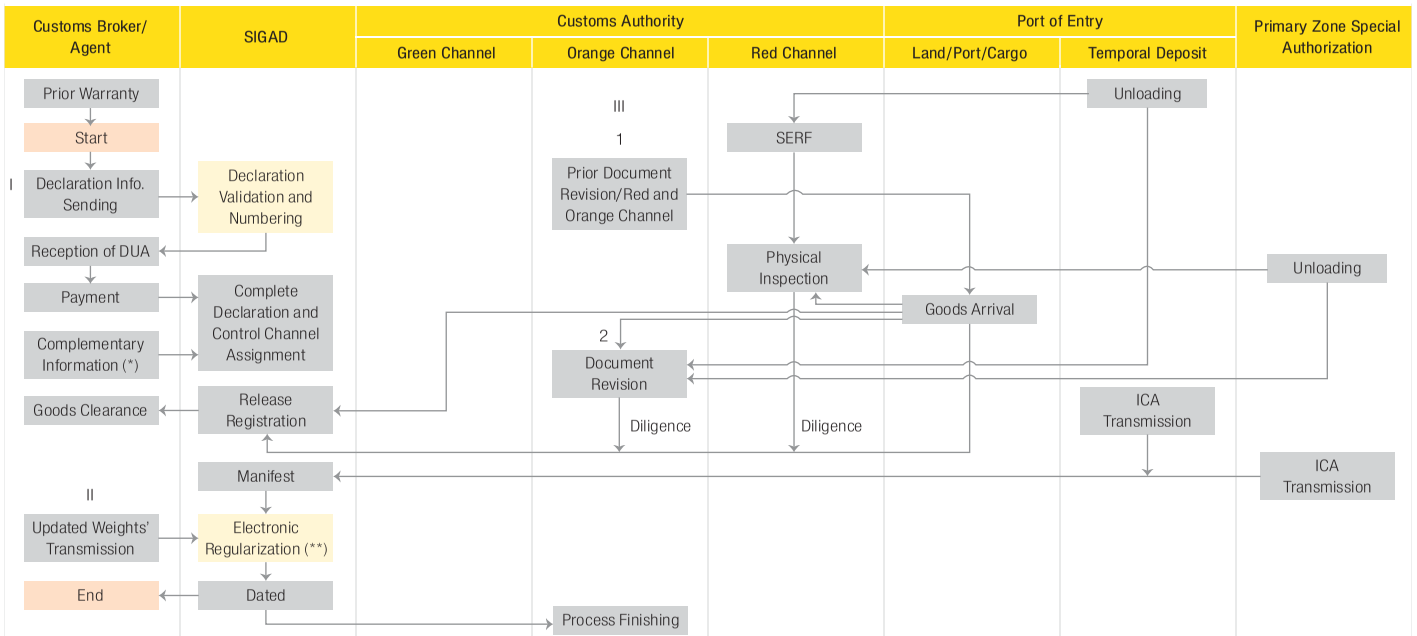
Upon payment (or warranty of it) of duties and fees, the shipments are assigned to a verification channel based on the customs risk management system. In particular, the system exogenously allocates these shipments to no inspection (green channel), documentary inspection (orange channel), or documentary and physical inspection (red channel) conditional on administrative, fiscal, and security risk factors.[34] In the case of imports, these factors are multiple and include the exporting firm, the origin country, the transport mode, the transport company, the countries where intermediate stops (if any) took place, the customs broker, the customs branch, the product, and the importing firm in Peru.[35] As will be seen in Chapter 2, this

[33] Sections 1.6 and 1.7 are based on Carballo, Graziano, Schaur, and Volpe Martincus (2016a).

[34] No more than 15 percent of the DUAs numbered in a given month in Callao can be subject to material control (SUNAT 2015).

[35] Unfortunately, data on the transport companies and the customs brokers are not available at transactional level. Aggregate information provided by SUNAT indicates that most importing firms work with just one customs broker and one maritime transport company, particularly when importing from a given origin country. Hence, the incidence of these actors in the trade process and specifically their consideration in the risk management scheme is most likely to be subsumed by the Peruvian importing firms operating

Figure 1.14 ■ Peru: Steps, Procedures, and Actors in the Import Process



I. Declaration Numbering
II. Control Channel
III. Regularization

(*) SDA: Rectification
(**) SDA: Only those that can be regularized

Source: SUNAT (2015).
Note: The figure is a flow diagram of the import process in Peru. DUA: *Declaración Única de Aduanas* (Single Customs Document); ICA: *Ingreso de la Carga al Almacén* (Cargo Admission into the Warehouse); SDA: *Sistema de Despacho Aduanero* (Customs Clearance System); SIGAD: *Sistema Integrado de Gestión Aduanera* (Integrated Customs Management System); SERF: *Solicitud Electrónica de Reconocimiento Físico* (Electronic Request for Physical Inspection).

contrasts with how the system works on the export side, where the number of risk sources before arrival at customs is very limited and primarily consists of the exporting company and the product-destination combination.[36] In addition to potentially causing additional delays, there are direct costs to the importer associated with the (orange and) red customs channel(s) due to the need to move, open, unload, reload, and close containers. At Peru's main seaport of Callao, these basic operations cost on average US$40 each. After verification, if any has taken place, customs sends the DUA and clears the shipment. At this stage, goods can be immediately picked up or left for some time if firms decide to take advantage of port storage facilities.

1.6.2 Data

This import process along with its main individual procedures can be described using highly disaggregated data for Callao.[37] These data, taken from customs import declarations and load manifests over 2007–2013 kindly provided by Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT), reveal the exact date associated with each of the various port-of-entry procedures. In particular, for each of these shipments clearing through the Callao port, the following data are observed: the date the ship arrived, the date the shipment was unloaded, the date the customs import declaration was created and registered, the date the physical inspection took place, the customs processing channel (green, orange, or red), and the date the shipment was released by customs.

Moreover, the database also encompasses transaction-level import data covering all transactions entering Peru in these years. In particular, each record informs an identification number for each importing firm, the origin country of the flow, the exporting firm in that country, the product code (10-digit Harmonized Systems – HS), and the import value in U.S.

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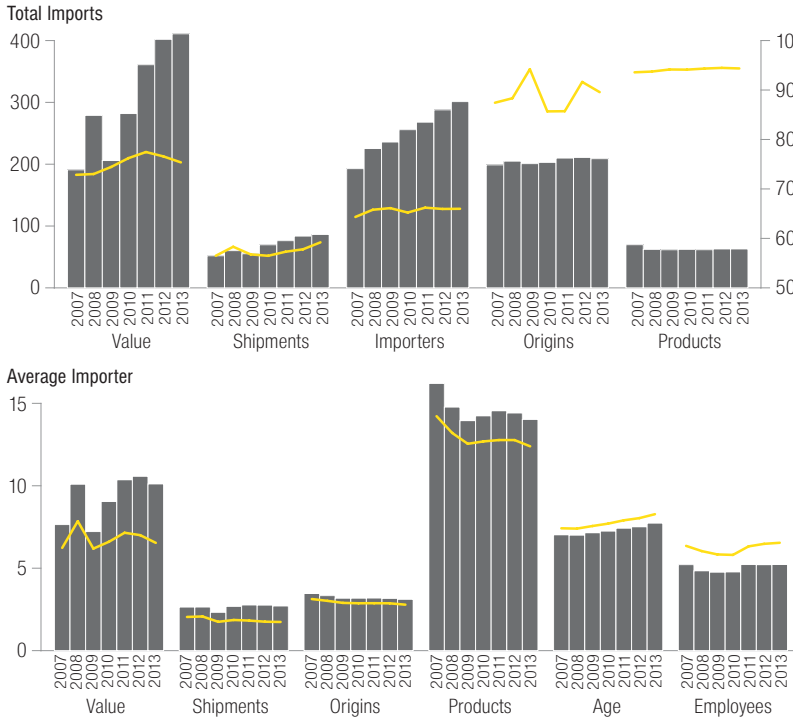
with them. More precisely, firm-year (or firm-origin-year) fixed effects will account for the roles of both customs brokers and shipping companies. Similarly, intermediate stops tend to be specific to origin countries, so that, in principle, their incidence can be considered controlled for by (product-)origin country-year fixed effects.

[36] See Chapter 2 for further details on customs risk management systems. Customs agencies generally do not have information on the domestic transport company that carries the shipment to the customs facilities.

[37] IDB and Q-Total Consultores (2016) present a detailed analysis of the import and export processes at Callao and the associated logistics aspects.

Figure 1.15 ■ Peru: Total Imports and Imports through Callao, and the Overall Average Importer and Callao Importer, 2007–2013



Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT).
Note: The upper panel shows the evolution of aggregate import indicators: import value (in increments of US$100 million), number of shipments (in increments of 100,000), number of importers (in hundreds), the number of origins (in hundreds), and number of products (in hundreds) (gray bars, left axis) along with the percentage share of imports through Callao in these aggregated indicators (yellow lines, right axis). The lower panel presents the mean import value (in increments of US$100,000), the mean number of shipments (in hundreds), the mean number of origins, the mean number of products, the mean age, and the mean number of employees (in increments of 10) across importers, both overall (left axis) and for Callao (yellow line, right axis).

dollars. In addition, firm-level data (i.e., sector of activity, number of employees, and year of establishment) are available.

The upper panel of Figure 1.15 compares the complete universe of import transactions for Peru with that of the imports that arrive at the seaport of Callao, where detailed time information is also available. Imports that clear at Callao account for approximately three-quarters of the total import value, two-thirds of the total number of importers, 60 percent of all import transactions, and 90 percent or more of all imported

products and countries of origin. These imports therefore capture most of Peru's total imports.[38]

The lower panel of Figure 1.15 characterizes the overall average importer and the average Callao importer along several relevant dimensions over the sample period. The average Callao importer has 65 employees, is eight years old, and buys 12.4 products from 2.8 countries through 180 shipments for approximately US$650,000. The national average importer has 52 employees, is seven years old, and buys 14 products from 3.1 countries in 271 shipments for roughly US$1 million. Hence, as expected based on the relative weight of Callao as a port of entry in total Peruvian imports, the average Callao importer is very similar to the overall figures except that it imports less in terms of value through a smaller number of shipments. The difference in values is primarily due to the fact that heavy goods tend to be imported through other ports that are located closer to the production facilities where these goods are actually used, whereas the difference in shipments is related to imports through airports, which typically consist of a larger number of smaller transactions. Finally, Peruvian importers use 22 customs offices, but the average firm uses only 1.03 customs offices and does not appear to use multiple ports of entry in response to port congestion, long queues at customs, or other delays.

1.6.3 The Distribution of Step-specific Border Times: Facts, Rationale, and Implications

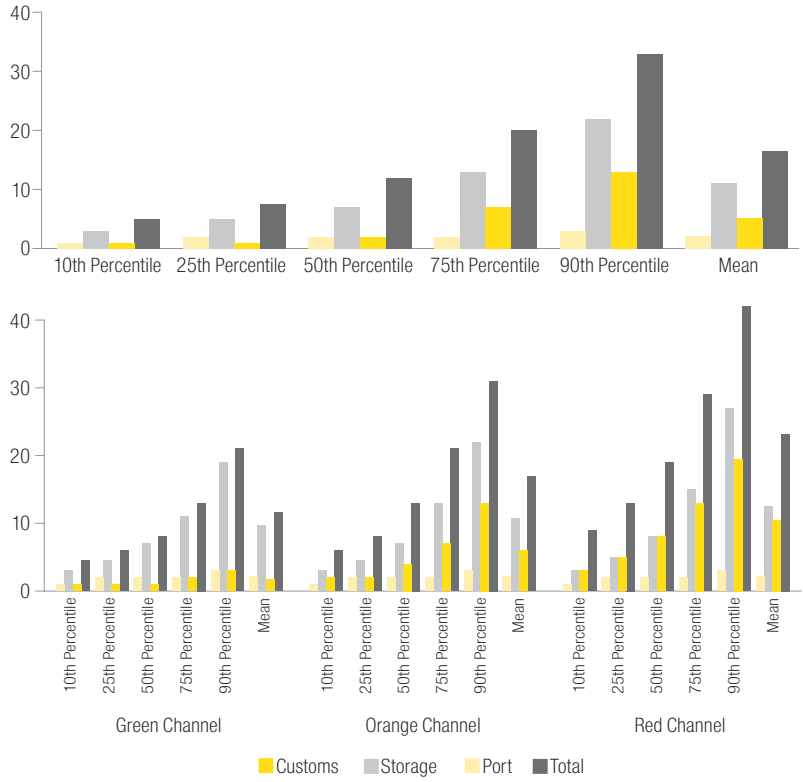
Facts

Fact 1: Total border times combine official and necessary processing of shipments—i.e., port and customs handling—and storage and preparation time between (and after) necessary processing steps.

Figure 1.16 presents percentiles of the distribution of the total number of days from ship arrival to exit from customs (i.e., total border time) as well

[38] An advantage of focusing on Callao is that the concentration of business activity around neighboring Lima mitigates concerns that heterogeneity in inland transportation costs affects results or that imports clearing through other ports are destined for Lima (Volpe Martincus, Graziano, and Cusolito, 2014).

Figure 1.16 ■ Peru: Distribution of the Number of Days at Each Import Step, by Customs Control Channel, 2013



Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT).
Note: The upper panel shows percentiles of the distribution of the total and procedure-specific border times along with their respective means, while the lower panel presents the same information broken down by customs processing channel. The x axis reports percentiles and the mean of the distributions, whereas the y axis shows the respective number of days.

as percentiles for each of the main segments of the import process for transactions processed at the Callao seaport in 2013, overall and broken down by customs processing channel.[39]

About 50 percent of the shipments are cleared in 12 days or less, but clearance can take over 40 days at the high end of the distribution. Mean (median) clearance time is 16.5 (12) days. For comparison, the

[39] Stages cleared within the same day are considered to take one day.

ocean voyage from Rotterdam to Callao takes about 18 days.[40] Based on existing estimates, this suggests that port-of-entry clearance is about as expensive as the time costs due to shipping. As a further reference, according to the old methodology used by the Doing Business indicators, total time to import into Peru was reported at 29 and 17 days in 2007 and 2013, respectively. The former is significantly higher than the mean and the median total import times as computed from transaction-level customs data for 2007 (15.9 days and 12 days, respectively) and the latter is similar to the mean (16.5 days) but substantially higher than the median (12 days) as calculated based on transaction-level customs data for 2013. It is worth mentioning that both times include preparation and storage times. The recent Doing Business methodology update results in a clearance time of about three days for border compliance and an additional three days for document compliance. The total of six days is similar to the total unloading and customs time shown in Figure 1.15. However, as stated in the definitions, the Doing Business measure is also supposed to encompass the time to obtain documents (e.g., documentary compliance).

Fact 2: Entry times are highly skewed to fast clearance times with a long tail of slow clearances.

Previous figures reveal that mean border times are greater than median border times. This is consistent with the fact emerging from Figure 1.17, which shows the distribution of the times for port handling, storage and preparation, as well as customs steps of the import process.

Port handling is the smallest part of the total border time, taking mostly between 1 and 4 days with a relatively tight distribution. Document preparation, shipment review, and storage account for most of the total border time, with a wide distribution ranging from two to over 30 days. In this regard, it should be mentioned that storage at port facilities is cheaper than market alternatives up to a certain number of days.[41]

[40] Data are from searates.com.

[41] It might therefore be argued that the government can potentially influence this time by changing storage charges. Nevertheless, this would only be a shift in the respective distribution, for which firms' decisions would still be the main driving force. Further, in this case, measures of time to trade would decline but in fact import costs would increase.

Figure 1.17 ■ Peru: Distributions of Border Times, 2013

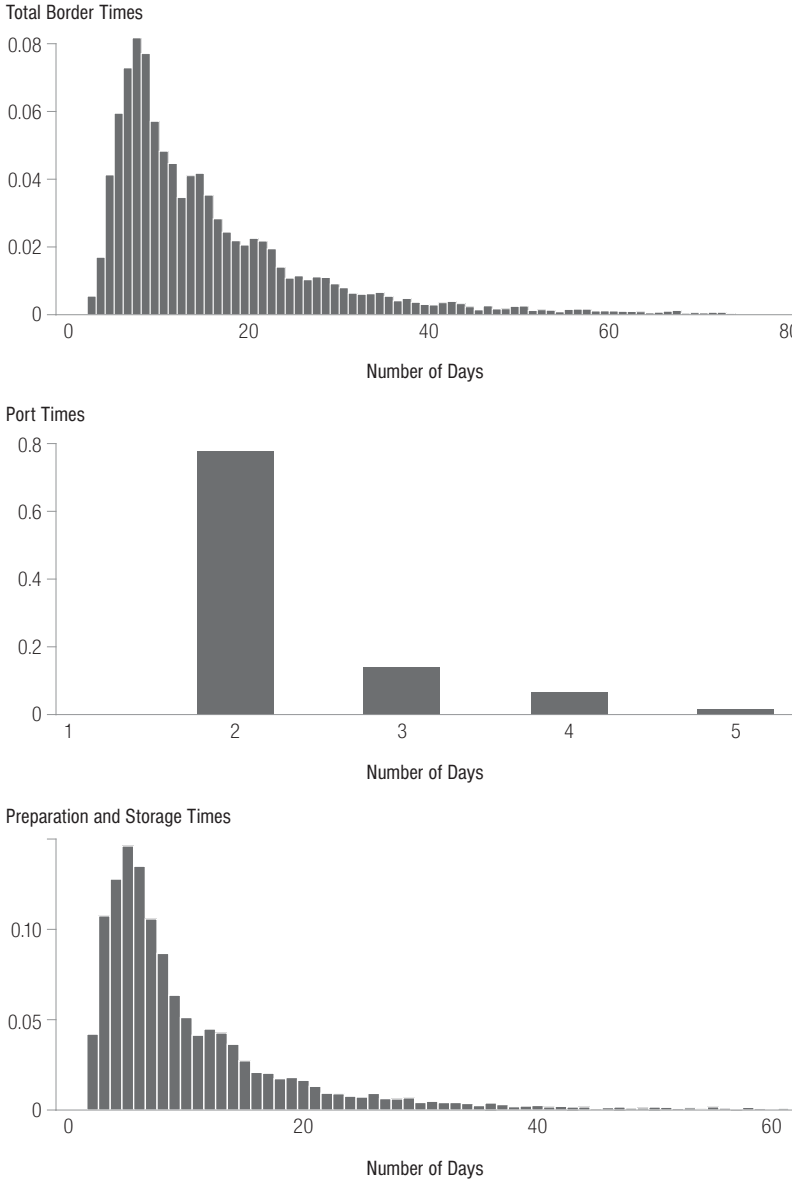


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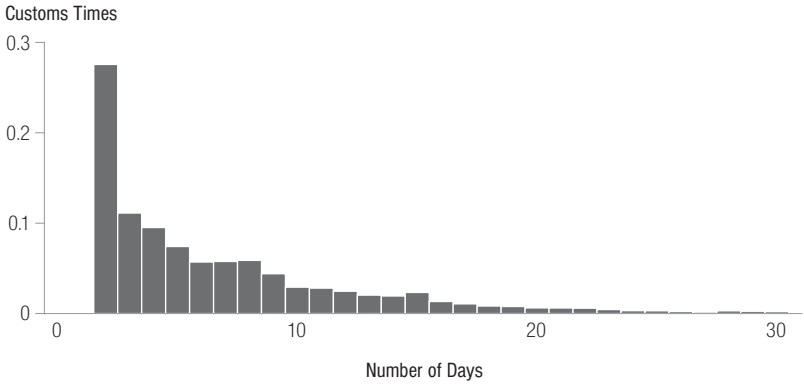
Figure 1.17 ■ Peru: Distributions of Border Times, 2013 (*continued*)



Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT).
Note: The panels are histograms that show the distribution of the total and procedure-specific border times. The x axis reports the number of days, whereas the y axis shows the fraction of shipments.

At the median, actual customs clearance times are low, but with a wide distribution taking from 1 to 14 days. Much of this variation is explained by the assigned customs channels. Shipments subject to documentary and especially physical inspection (orange and red channels, respectively) take significantly longer. It is worth noting that customs times only account for less than 20 percent of the total border times for the median shipment and not more than 50 percent of the total time for those physically inspected. Hence, in the case of imports, customs is certainly an important component in the process that adds time between origins and destinations, but it is definitely not the only one.

Fact 3: Entry times vary across origin countries, products, exporting firms, and especially importing firms.

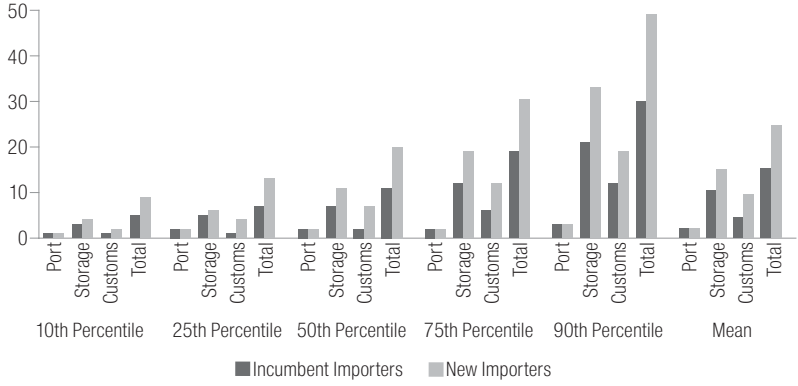
Figure 1.18 shows that there is significant heterogeneity in border times across different firms. In particular, the data reveal that mean and median times are about three days shorter for large firms.[42] This heterogeneity is primarily driven by the customs stage. Differences are even more

[42] Firm size is measured by the number of employees such that firms with more than 200 employees are considered large (Volpe Martincus and Carballo 2008). The same pattern prevails when firms are grouped based on their total imports.

Figure 1.18 ■ Peru: Distribution of the Number of Days at Each Import Step – Firm Size and Experience, Product Categories, and Origins, 2013

Small Importers versus Larger Importers

New Importers versus Incumbent Importers



Time-Sensitive Products versus Time-Insensitive Products

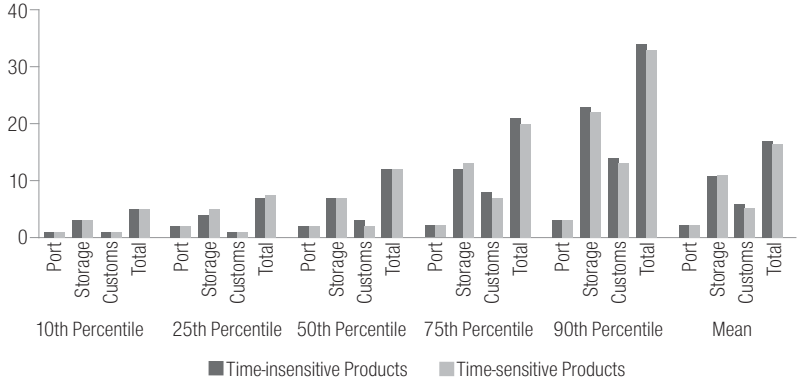


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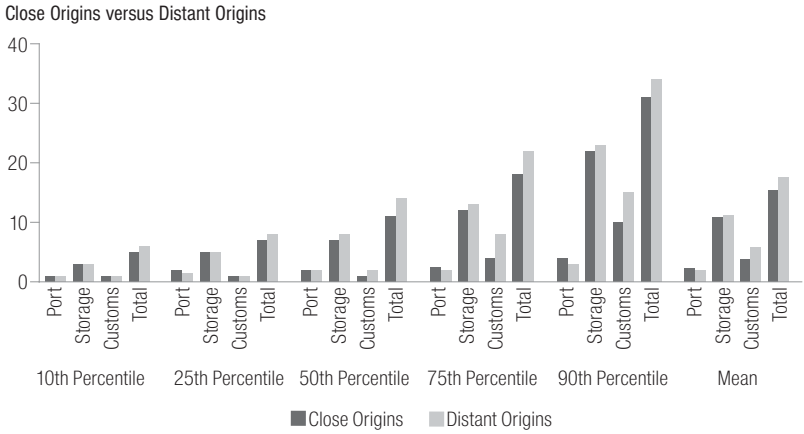
Figure 1.18 ■ Peru: Distribution of the Number of Days at Each Import Step – Firm Size and Experience, Product Categories, and Origins, 2013 (*continued*)



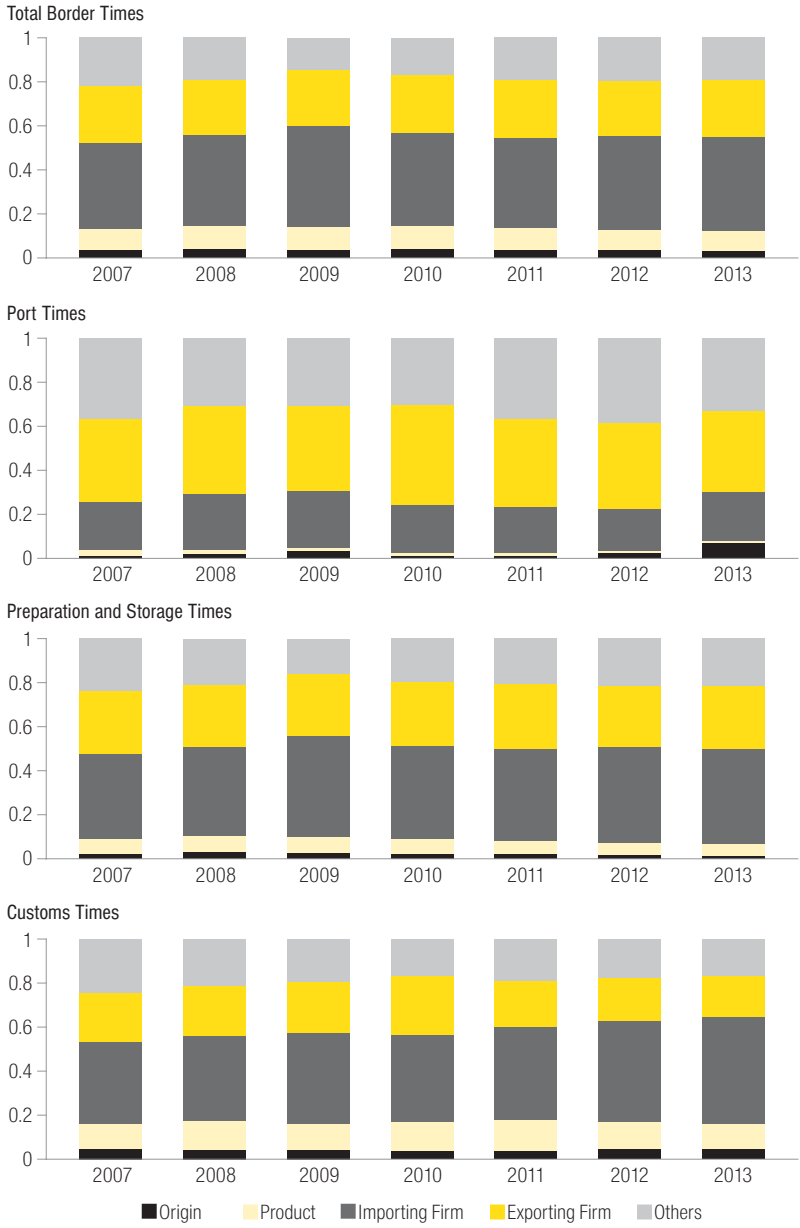
Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT).
Note: The first panel shows percentiles of the distribution of the total and procedure-specific border times along with their respective means for large importers (i.e., firms with more than 200 employees) and small importers (i.e., firms with up to 200 employees). The second panel presents percentiles of the distribution of the total and procedure-specific border times along with their respective means for incumbent/experienced importers (i.e., firms that imported in previous years) and new/inexperienced importers (i.e., firms that imported for the first time in 2013). The third panel shows percentiles of the distribution of the total and procedure-specific border times along with their respective means for time-sensitive products and time-insensitive products, whereby time sensitiveness is defined based on estimates from Hummels and Schaur (2013). The fourth panel displays percentiles of the distribution of the total and procedure-specific border times along with their respective means for close origins (i.e., countries whose distance to Peru is up to the median of the respective distribution) and distant origins (i.e., countries whose distance to Peru is above the median of the respective distribution).

pronounced when new and incumbent importers are compared. Importantly, in this case, the time for preparation and storage accounts for a substantial share of such differences. The remaining panels in Figure 1.18 highlight that there is also some degree of heterogeneity across products depending on their degree of time sensitiveness, and across origin countries depending on how far away they are from Peru.

More systematically, Figure 1.19 shows how border times relate to origin countries and exporting firms, products, and importing firms.[43] Across all stages of the entry process, country of origin explains a relatively

[43] The median border time is computed over all shipments for each importer, product, origin country, and exporting firm in the year in question and (the natural logarithm of) this time is regressed on the respective sets of fixed effects. Figure 1.19 reports the R^2 from these regressions for every year of the period spanning from 2007 to 2013.

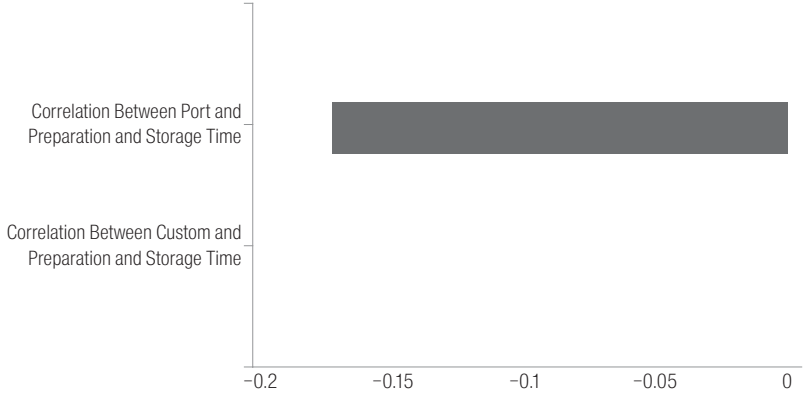
Figure 1.19 ■ Peru: Factors Driving Observed Border Times, 2007–2013



Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT).

Note: The panels show the share of the variation of the border times accounted for by the different factors as computed based on the R^2 of a set of regressions of the (the natural logarithm of) median border time across shipments for each importing firm, product, origin, and exporting firm in the year in question on origin fixed effects; origin and product fixed effects; origin, product, and importing firm fixed effects; and origin, product, importing firm, and exporting firm fixed effects.

Figure 1.20 ■ Peru: Preparation and Storage Time as Buffer Time, 2007–2013



Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT).
Note: The figure shows the correlation between port and preparation and storage times and between customs and preparation and storage times after accounting for importing firms and product-origin combinations. The bar informs the percentage change in the time spent in an import stage as a consequence of a 1 percent increase in the time spent in the previous import stage. Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

small portion of observed times. The product explains some fractions of preparation and storage as well as customs clearance times. This is likely due to importers providing buffer time for long delays and customs focusing control efforts on particular products. The importing firms account for by far the largest share of the time variation throughout the entry process and particularly at the preparation and storage and customs stages. This suggests that heterogeneity across importers is directly related to observed border times. Finally, while exporting firms are also responsible for a substantial part of these times, their explanatory power is generally lower than that of the importing firms.

The variation of times across importing firms supports the conjecture that they may affect observed times during the entry process. In this case, total border times are outcomes endogenous to firms' decisions. This creates concerns about their appropriateness to capture relevant border times and to quantify their trade effects.

Fact 4: Firms absorb long unloading times with shorter storage and preparation times. In other words, firms' buffer times respond endogenously to port times.

Figure 1.20 reports the correlations between the times at consecutive border stages after controlling for multiple factors such as differences across firms, travel times from the origin in general and country-specific uncertainty in arrival times in particular, and product-specific storage costs.[44] These correlations reveal a significant negative relationship between time at the port and time spent at storage facilities and in preparing documentation for customs. This can be seen as evidence that firms use storage time in port as a buffer to absorb shocks in the supply chain that result in longer clearance times.

Rationale

These patterns of border times can be rationalized using some guidance from economic theory. If actual port and customs processing times are uncertain and firms are concerned with meeting a delivery date, firms will optimally allocate time in their supply chains to clear the port of entry, including storage and buffer time. In so doing, firms will trade off the risks of late deliveries and the implied costs with those associated with a longer supply chain. Specifically, increasing the lead time by choosing an earlier shipping date reduces the risk of missing the delivery date, but raises container rental, financing, and depreciation costs. The consequence is that total border times are a combination of actual port and customs processing times plus endogenous preparation and storage times.

Implications

Given the rationale derived from this framework, the descriptive statistics presented above have important implications for measuring border times and estimating their economic effects in general, and evaluating trade facilitation policies aimed at reducing these times in particular. The observed time a shipment is in the supply chain at the border may differ from required port and customs processing times because a firm can

[44] The estimating equation has as a dependent variable the change in (the natural logarithm of) the time spent at one particular stage and as the main explanatory variable the change in (the natural logarithm of) the time spent at the previous stage along with firm-year and product-origin-year fixed effects.

include buffer time to avoid untimely delivery.[45] This complicates the interpretation of country rankings based on total border times if they are supposed to reflect port or customs efficiency because they mix time measures that are primarily exogenous and due to processing with measures that depend on firms' behavior. More precisely, two countries can be identically efficient in terms of their processing times but differ in terms of their total times due to differences in buffer times associated with differences in lead-time costs and late delivery costs. In short, policy-relevant border times are more accurately measured using actual processing times associated with ports and customs handling.

Further, even when so defined, border times exhibit a substantial variation across products, origins, and especially importers. Survey-based, country-level measures such as the Doing Business indicators and the Logistic Performance Index—including their specific components that are closer to processing times—can then be strongly influenced by countries' portfolios of traded goods, set of sourcing countries, and specific characteristics of their populations of trading firms, in addition to how border procedures are designed and actually operate. As a consequence, cross-country variation in these measures and even in raw summary measures of border time distributions as computed from transaction-level data may not necessarily reflect differences in the efficiency of the respective ports or customs agencies.[46] More specifically, two countries can be identically efficient in terms of their processing times conditional on firms, products, and partners but differ in terms of their mean/median times due to compositional effects. In other words, as seen below, without information on distributions, economic analyses based on aggregate measures face nontrivial methodological challenges because critical heterogeneities cannot be accounted for. This is also the case because effects of border times can be expected to differ in nontrivial ways between parts of these distributions that can be linked to the aforementioned dimensions (i.e., firms, products, origin countries).

[45] This may include time associated with the management of tax and duty payments.

[46] As mentioned above, the most recent Doing Business methodology makes a first step in this direction by explicitly identifying the main export/import product and the respective main destination/origin to which the reported times refer. This, however, precisely highlights the lack of generality of the measure.

1.7 The Trade Impact of Border Times: Evidence from Peru

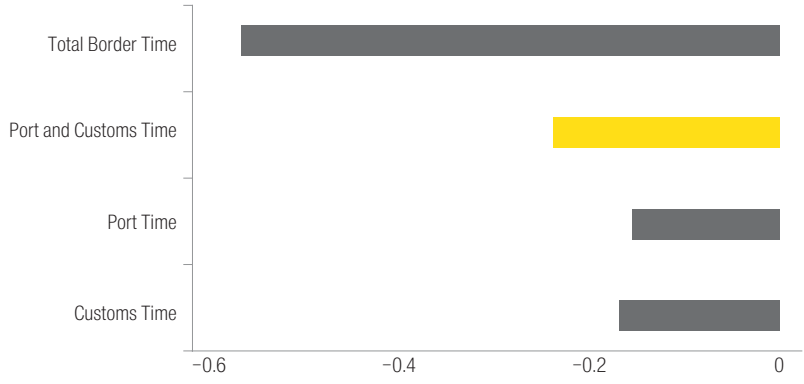
1.7.1 Baseline: What Are the Effects of Border Times on Imports?

As seen in Section 1.6, border times are most properly represented by those times that correspond to actual port and customs handling. In addition to measurement issues, establishing the impact of border times on trade flows measured in this way faces estimation challenges. As discussed above, both imports and border times may systematically differ across firms (e.g., due to their different sizes, productivity levels, etc.) and product-origin combinations (e.g., due to different tariff treatments, etc.) over time. For this reason, the estimations need to account for unobserved time-varying firm-level and product-origin factors.[47] Furthermore, large shipments may take longer to clear the port of entry or firms may have incentives to speed up small emergency shipments that are required in a production process. Hence, the size of the flows can potentially determine the respective border times. This is precisely the reverse of the relationship of interest. This is why identifying the causal link going from border times to trade requires finding factors that generate variation in these times, do not suffer from the reverse causality problem mentioned above, and are not directly related to the value of the trade flows but indirectly through these times (i.e., technically, an "instrument"). This is likely to be the case with port congestion and customs inspections, which are therefore sources of exogenous variation.[48]

[47] The baseline-estimating equation therefore has as a dependent variable the change in (the natural logarithm of) the import value at the firm-product-origin-year level and as the main explanatory variable the change in (the natural logarithm of) the border times, along with importing firm-year and product-origin-year fixed effects. It should be mentioned that the results presented here are robust to stricter sets of fixed effects such as firm-origin-year or firm-product-year along with product-origin-year fixed effects.

[48] The equation described in the previous footnote is estimated by instrumental variables using port congestion and customs physical inspections as such sources of exogenous variation in border times or instruments. More precisely, simultaneous arrival of several vessels translates into longer border handling and processing times due to capacity limitations of cranes and storage areas within the port. Hence, the median number of other vessels that arrive on the same date shipments of a given importer-product-origin do within a given year is used as an instrument. Similarly, inspections are associated with longer customs clearance times. Thus, the median assignment to the orange or red channel is used as an additional instrument. In particular, this instrument takes the value of one if 50 percent or more of the shipments in a given firm-product-origin-year quadruple is assigned to the orange or red channels. The assignment to customs channels can be considered exogenous conditional on importer and product-origin combinations. Chapter 2 will thoroughly examine this issue.

Figure 1.21 ■ Peru: Impact of Border Times on Firms' Imports, 2007–2013

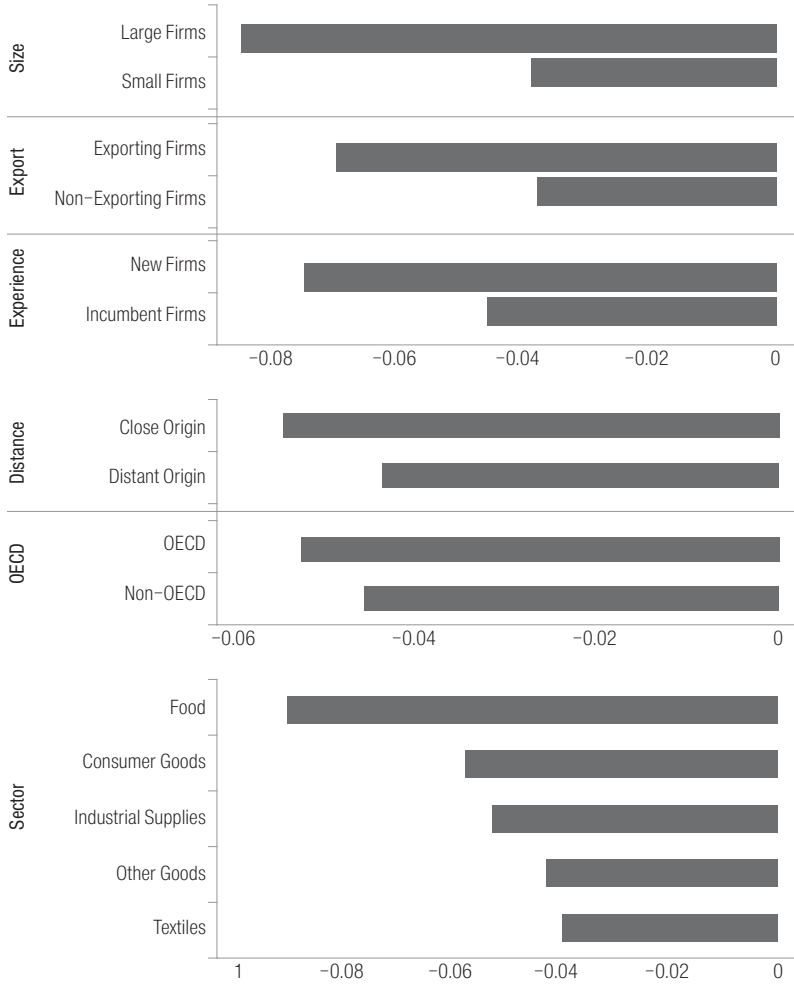


Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT). Estimates presented in the figure are reported in Table 7 in Carballo, Graziano, Schaur, and Volpe Martincus (2016a).
Note: The figure shows the estimated percentage change in import values in response to a 1 percent increase in border times. Border times are alternatively defined as total border times (port, storage and preparation, and customs times), port and customs times, port times, and customs times.

Taking these considerations into account, border times have a significant negative impact on imports (Figure 1.21). Specifically, the estimated reduction in imports as a consequence of an increase of 10 percent in border times is 2.4 percent if border times are measured using actual port and customs processing times. The estimated effect would be 5.7 percent if instead total border times were used, that is, including the times associated with firms' storage and paperwork preparation. This shows that total time-to-trade measures in general and those including components endogenous to firms' optimizing behavior in particular can lead not only to country rankings that are not fully consistent but may also yield biased estimates of the costs of border times.[49]

[49] It is worth mentioning that these results remain the same when products requiring additional permits from other border agencies are excluded, when flows making use of express channels are eliminated, and when focusing on goods that are heavy and are accordingly less likely to allow for transport mode substitution (from sea to air).

Figure 1.22 ■ Peru: Impact of Border Times on Firms' Imports, by Types of Firms, Products, and Origins, 2007–2013



Source: Author's calculations based on data from Peru's National Tax Administration (*Superintendencia Nacional de Administración Tributaria* – SUNAT). Estimates presented in the figure are reported in Table 10 in Carballo, Graziano, Schaur, and Volpe Martincus (2016a).

Note: The figure shows the estimated percentage change in import values in response to a 1 percent increase in border times for different groups of firms, origin countries, and products. Border times are measured using actual port and customs processing times. Small firms are those with up to 200 employees, whereas large firms are those with more than 200 employees. Exporting firms are those importing firms that also export, whereas nonexporting firms are those that only import. Incumbent firms are those that imported in previous years, whereas new firms are those that import for the first time. Close origins are those whose distance to Peru is up to the median of the respective distribution, while distant origins are those whose distance to Peru is above this median. OECD: Organization for Economic Cooperation and Development.

1.7.2 The Distributional Angle: Are the Import Effects of Border Times Heterogeneous across Firms, Products, and Origins?

Figure 1.22 reveals that the effects of border times are heterogeneous.[50] They are different for different types of firms, products, and origins. In particular, imports from large and exporting firms and new firms are more sensitive with respect to port-of-entry times. This is consistent with the intuition that large exporting firms have more rigid production processes with complicated supply chains that make time more costly. In the case of new firms, the explanation may be that they primarily supply buyers who are sensitive to delivery schedules and thus tend to switch suppliers when they fail to meet these schedules.

Time-sensitive goods such as food products are significantly more affected by longer border times. Sector-specific estimates suggest that this is particularly the case with imports of vegetable products. Furthermore, border times seem to matter more for imports from close-by countries. This is consistent with previous evidence according to which time-sensitive products are sourced from nearby locations.[51] Shipments from high-income countries are also more responsive with respect to times, possibly because importer-exporter pairs involving developed countries rely more heavily on lean supply-chain strategies.

1.8 Summary and Conclusions

The time required to cross borders has, to date, typically been measured with survey-based, country-level, or sample-specific measures of total time to trade or customs clearance times. Thanks to the introduction of new information systems, customs and other border agencies can now systematically gather precise and detailed information on the processing of trade flows. These information systems capture procedure-specific times for every single shipment, along with rich additional data on these shipments. Border times can therefore be consistently measured and

[50] The estimated effects are obtained by augmenting the baseline equation with interactions between the change in (the natural logarithm of) the border processing times and binary variables that identify the different categories involved. The nonconditional effects are accounted for by the firm-year and product-origin-year fixed effects.

[51] See Evans and Harrigan (2005).

reported across a wide range of countries. This allows countries to be properly ranked and the evolution of those times to be tracked by making use of the universe of these transaction-level, stage-specific data and applying common measurement criteria such as those of the World Customs Organization's time-to-release study, including rules to compute given summary measures of the underlying time distribution.[52]

These kinds of data reveal that a substantial amount of total border times correspond to storage and preparation times, which are endogenous to firms' behavior. It is not necessarily the port or customs agencies that are inefficient, but rather firms that take a long time to clear the border. Conceptually, if scheduling additional lead time is expensive, firms trade off the costs of this time with the costs of running late to decide how much buffer time to allow for in the supply chain at the border. As a consequence, as long as they include firms' buffer times, observed total border times are not necessarily informative about the relevant bottlenecks in the supply chain or long processing times. More specifically, total border times do not map one-to-one with actual processing times. Ranking countries and identifying the benefits of reducing relevant border times based on aggregate survey data on total border times can therefore be misleading.

The message for policymaking is that, to properly evaluate investments in trade facilitation, it is important to focus on border times that are driven by the actual and necessary processing of shipments and cost estimates of these times.[53] When measured using these customs transaction-level data and estimated addressing natural econometric problems, the evidence presented in this chapter suggests that these border times have a significant negative impact on imports. In Peru, a 10 percent increase in these times results in a 2.4 percent decrease in imports. This impact is larger for new and larger importing firms as well as for products that are more sensitive to time.

[52] WCO 2011.

[53] In the old Doing Business methodology, the customs clearance and port and terminal handling times would in principle be the closest to an exogenous processing time.

>> The Border Traffic Light: Customs Risk Management Systems 2

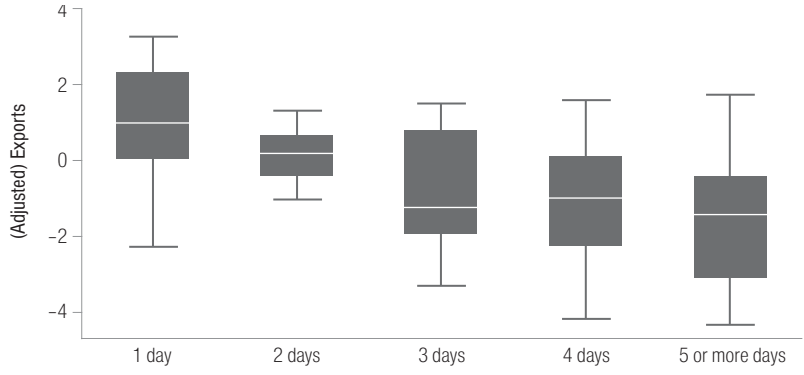
2.1 What Is Known about the Impact of Customs Processing Times on Trade?

As seen in Chapter 1, customs times are one of the main components of border times. Given that this processing time affects the time between origins and destinations, custom agencies play a crucial role in facilitating or hindering exports and imports. A number of papers have estimated gravity models and variants thereof to examine the effects of total time to trade, customs and technical control times, and time at the border on aggregate bilateral trade, sectoral bilateral trade, the number of exported products (or the extensive margin of products), the number of reached destinations (or the extensive margin of destinations), and the frequency and size of shipments for various samples of countries and product categories.[1] A few studies use firm-level trade data to explore the influence of time to clear customs on export status, export intensity, and destination diversification.[2] These papers conclude that customs delays have a significant negative impact on export outcomes, especially for time-sensitive products.

[1] See Bourdet and Persson (2010), Djankov, Freund, and Pham (2010), Freund and Rocha (2011), Hornok (2011), Hornok and Koren (2015a), Martínez-Zarzoso and Márquez-Ramos (2008), Nordas (2006), Persson (2010), and Zaki (2010).

[2] See Dollar, Hallwar-Driemeier, and Mengistae (2006), Li and Wilson (2009a, 2009b), and Yutaka (2008).

Figure 2.1 ■ World: The Standard Approach to Estimate the Impact of Customs Times, 2011



Source: Author's calculations based on data from the World Bank's Doing Business indicators and UN COMTRADE.
Note: The figure shows box plots of the distribution of export levels across countries (after netting out their GDP and population) with different customs time to export.

While certainly insightful, this literature has limitations, which makes the evidence on how customs processing times affect firms' trade performance preliminary and incomplete. Thus, most analyses rely on cross-country variation in the measures of perceived customs times reviewed in Chapter 1 and the single-value, country-level Doing Business measure of time to trade (or its components) in particular to identify the effects of interest (Figure 2.1).

This identification strategy has drawbacks. First, as discussed in Chapter 1, these indicators have a number of shortcomings that affect their precision and, second, unobserved country characteristics that are relevant for trade and potentially correlated with perceived customs times are not satisfactorily controlled for and as a consequence can yield inaccurate estimated effects.

2.2 The Border Traffic Light

All shipments leaving or entering countries must be processed by their respective customs agencies. These agencies are responsible for ensuring that these shipments are in accordance with relevant trade regulations and meet security standards. In order to achieve this, they conduct documentary or physical controls of shipments to varying extents. More specifically, some

shipments are not inspected, some shipments are only subject to documentary inspection, and some shipments undergo both documentary and intrusive examination. In Peru, for instance, when shipments are assigned to an inspection, firms have to present a number of supporting documents including authenticated copies of the transport document, the invoice, and the certificate of origin if applicable. Among other matters, the inspector verifies the risk of the good; consistency between the documentation and the customs declaration (DUA); the description, nature, tariff classification, and value of the goods; and tax and customs payments.[3] When a shipment is assigned to intrusive examination, the customs agent chooses randomly and inspects no less than 5 percent of the packages. In particular, the agent checks the consistency between the documents—including the transport document, invoice, and DUA—and the actual shipment. In so doing, the official can take samples and pictures.[4]

In several Latin American and Caribbean countries, these different processing channels are called green, yellow/orange, and red, respectively. As such, they are akin to a border traffic light, whereby shipments under the green channel can go through and shipments under the yellow/orange and red channels are stopped. The latter shipments experience a significantly more pronounced slowdown, as their processing involves physical inspection and hence a full stop and a longer waiting time. It is worth mentioning that many countries in the region assign export shipments to one of just two possible processing channels: green and red.

In this regard, the question arises of how customs agencies assign shipments to the different channels. To do so, these agencies increasingly use risk management systems to maximize ascertaining which shipments should be inspected and minimize interference with trade flows. These systems make it possible to move from inspecting 100 percent of shipments, as was common in several developing countries a few years ago (at least on the import side), to focusing attention and limited customs inspection resources on a substantially smaller subset of those shipments that are considered riskier (i.e., less likely to be compliant with regulations) and thereby facilitate the border crossing of shipments with lower risk.

Specifically, how shipments are channeled is determined based on risk management systems with varying degree of sophistication. In the

[3] See SUNAT (2015).
[4] See SUNAT (2010).

most basic version, selectivity criteria primarily consist of fixed rules, i.e., "blacklists" of exporting/importing firms, goods, and destinations/origins as established using simple information from customs declarations and prior infractions, plus a random component to avoid perfect prediction. These risk-profile-defining dimensions can be combined, or not, so that a physical inspection can be decided upon based on just one of these criteria (e.g., imports coming from a certain country regardless of how well known the importing firm might be). This typically results in low effectiveness, that is, high rates of intrusive inspections and low rates of irregularities.[5]

The most advanced variants apply more sophisticated risk management techniques involving intensive use of multivariate econometric tools on a broader set of the data generated by customs and other agencies' information systems, particularly for imports. These data can cover agents, flows, controls, and outcomes, including accurately recorded infractions (e.g., importing firm, exporting firm, transportation mode, transport company, customs broker, goods, origins/destination, etc.) and intelligence activities.[6] This more thorough approach is generally associated with increased effectiveness without negatively affecting tax revenues or security.[7]

Table 2.1 describes the approaches used by selected customs agencies in Latin America. In Brazil and especially in Mexico, fixed rules coupled with random draws are the prevailing criteria. Both Brazil and Peru have incorporated econometric techniques in their risk management systems.

As shall be seen below, channel assignment makes an important difference: shipments subject to inspection take longer to clear customs.[8] This information is particularly relevant because it helps properly identify the impact of customs processing times on firms' trade outcomes. More frequent assignments to examination are associated with longer times at customs, which in turn can adversely affect firms' trade flows. More

[5] See Laporte (2011).

[6] See Geourjon and Laporte (2005) and Geourjon, Laporte, and Rota Graziosi (2010). These techniques are already used in the insurance and banking sectors (Bolton and Hand 2002; Phua, Lee, Smith, and Gayler 2005).

[7] See Laporte (2011).

[8] The more thorough the inspection (i.e., unloading and examining a sample of the merchandise versus unloading and examining all merchandise), the longer it takes to clear the shipment through customs. Risk management systems can also be used to assign shipments to inspections of different levels of intensity.

Table 2.1 ■ Selected Latin American Countries: Risk Management in Customs Agencies, 2014

Country	Trade Flow	Transport Mode	Criteria			
			Fixed Rule	Econometric	Random	Others
Brazil	Import	Sea	33.9	30.0	26.4	9.8
Brazil	Import	Land	25.8	34.9	38.6	0.6
Brazil	Import	Air	42.5	20.1	32.4	5.0
Brazil	Import	Other	13.2	0.5	86.3	0.0
Chile	Export	All	44.2	0.0	6.9	48.9
Chile	Import	All	68.0	0.0	9.4	22.6
Mexico	Export	All	33.3	0.0	66.7	0.0
Mexico	Import	All	38.5	0.0	30.8	30.8
Mexico	Transit	All	50.0	0.0	50.0	0.0
Peru	Import	All	56.5	31.2	4.3	8.1
Peru	Export	All	66.6	12.6	2.6	18.1

Source: Jordana and Volpe Martincus (2016).
Note: The table reports the percentage share of the criteria used by the selected customs agencies to assign processed shipments to physical inspection as measured by their respective percentage weight.

specifically, customs-inspection-driven delays can be seen as trade costs accruing to each transaction, and firms can respond to these costs by adjusting the number and size of their shipments to given destinations/from given origins, which could potentially result in changes in their foreign sales/purchases. The intensity of this adjustment can vary across products depending on their characteristics.[9]

2.3 Case Study: Exporting from Uruguay[10]

2.3.1 The Export Process

In Uruguay, as well as other Latin American countries, exports are subject to physical inspection to control for tax reimbursement claims and fight illegal trade, and because taxes have been collected on foreign sales of

[9] See Hornok and Koren (2015a).
[10] This section is based on Volpe Martincus, Carballo, and Graziano (2015, 2016).

certain products, among other reasons. However, not every single shipment is inspected. In fact, only a fraction of them are inspected, and this selection is determined by the customs agency's risk management system.

The typical export process in Uruguay is illustrated in a stylized manner in Figure 2.2.[11] Once the terms of the trade deal between the exporter and the buyer are established (i.e., quantity, price, shipment method, etc.), the exporter requests the service of a customs broker, who is given the pro forma invoice or final commercial invoice and the packing list (if applicable). This broker completes an electronic Single Customs Document (*Declaración Única Aduanera* - DUA) and sends it to the customs agency (*Dirección Nacional de Aduanas* - DNA), which validates the DUA and sends back a message containing the number assigned to the DUA and the registration date. When the shipment is at the customs departure point, the DUA is printed and all export documentation is put into an envelope along with a sworn declaration (signed by the customs broker and the exporter), the pro forma or final invoice, a copy of the bill of lading, and any other documentation required (e.g., sanitary certificates, etc.).

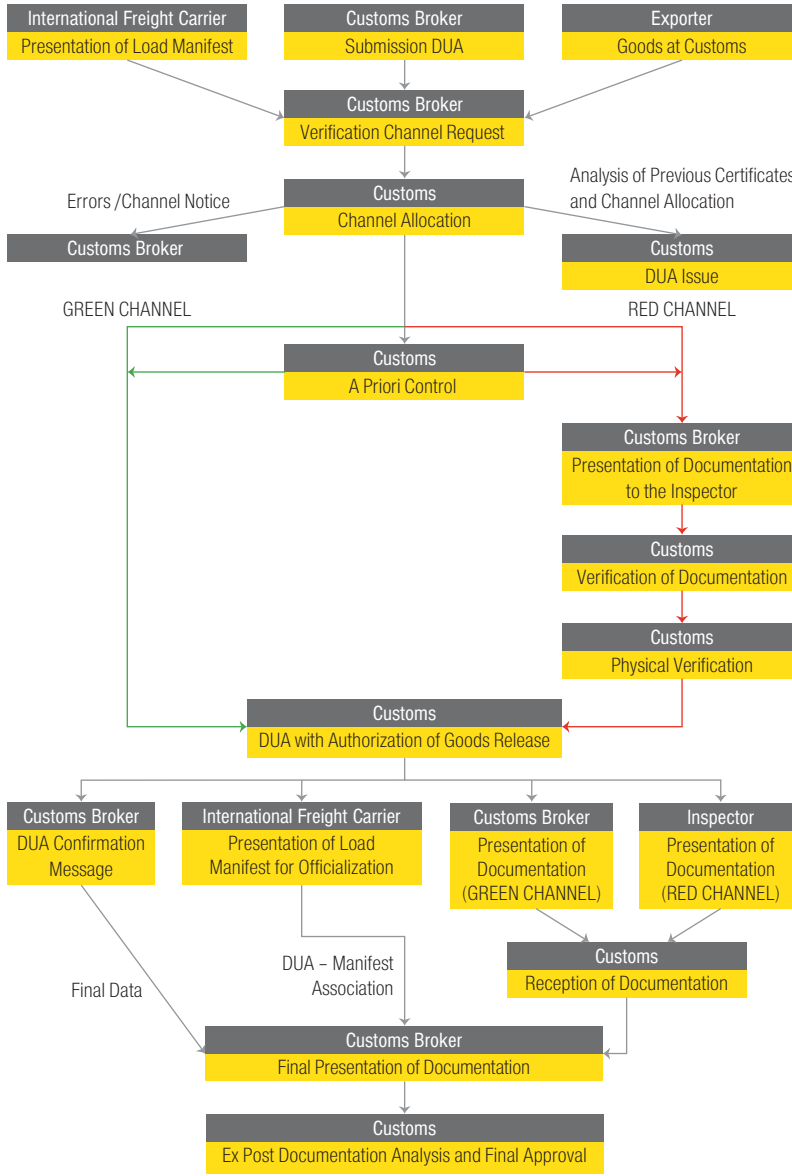
At this stage, the customs broker requests an ex ante verification channel for the operation. Customs agencies that apply risk management, such as the DNA, use information on the DUA to determine whether shipments are assigned to no inspection (green channel) or inspection of documents and merchandise (red channel). After the inspection, if any has taken place, customs sends the DUA with the clearance of the shipment. The merchandise is then loaded at the port, airport, or border crossing. Afterwards, the customs broker sends an electronic message to complete the transaction, based on information that will be sent to the DNA in the third and last electronic message with definitive shipping data (i.e., weight, quantity, number of packages, value). Finally, the DNA completes the export in its information system and carries out an ex post documentation verification against the third message sent by the customs broker.

2.3.2 Data

The main dataset consists of transaction-level export data from 2002 to 2011 from the DNA. Specifically, each record includes a firm's identification number, the product code (10-digit HS), the customs branch

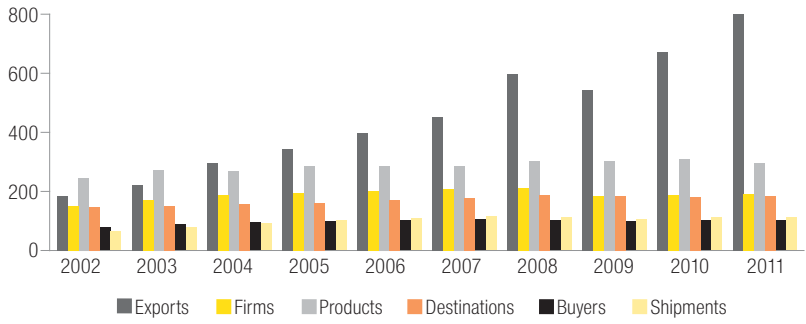
[11] See URUGUAY XXI (2012).

Figure 2.2 ■ Uruguay: Customs Risk Management



Source: Prepared by the author based on information from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: DUA: *Declaración Única Aduanera* (Single Customs Document).

Figure 2.3 ■ Uruguay: Aggregate Export Indicators, 2002–2011



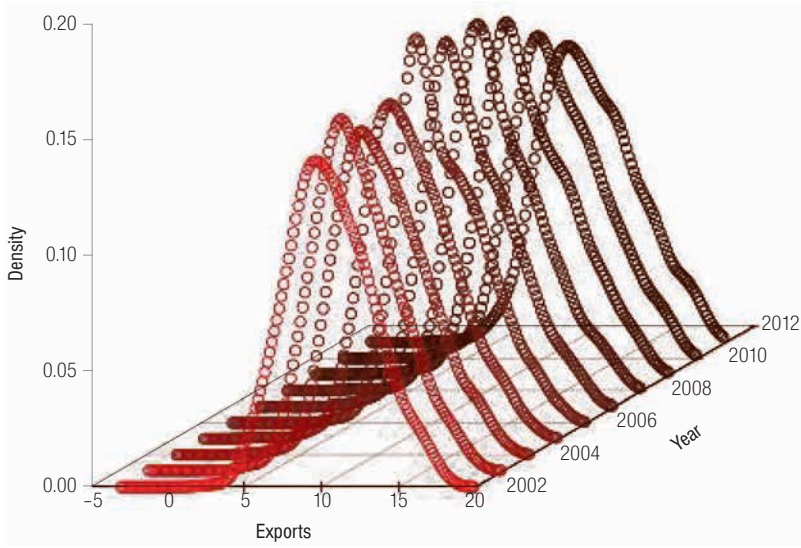
Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The figure shows the evolution of aggregate export indicators: export value (in increments of US$10 million), number of exporting firms (in increments of 10), the number of destinations, the number of products (in increments of 10), the number of buyers (in hundreds), and the number of shipments (in thousands).

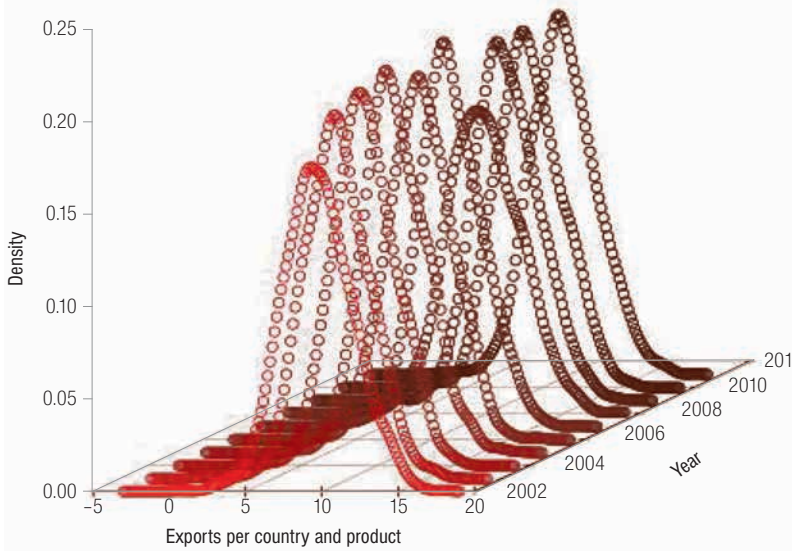
through which the shipment exits Uruguay, the destination country, the foreign buyer, the transport mode, the export value in U.S. dollars, the quantity (weight) in kilograms, the channel through which the transaction was processed (either green or red), the date when customs processing of the shipment was requested (channel request), and the date when the shipment was authorized to leave customs (release date).[12]

Figure 2.3 reports Uruguay's total exports from 2002 to 2011 along with key aggregate extensive margin indicators. Exports grew more than 300 percent between these years to reach US$8 billion in 2011. These foreign sales expanded along the firm, destination, and product extensive margins. Thus, the number of firms, destination countries, and exported products increased by 27.1 percent, 27.4 percent, and 20.5 percent from 2002 to 2011, respectively. Yet, most of the expansion is accounted for by a larger intensive margin on the product-country dimension, i.e., larger average exports by product and country. This was the result of both larger average shipments and a larger number of shipments, which increased by nearly 75.3 percent. This expansion is evident in Figure in 2.4, which shows how the annual distributions of firms' total exports, average exports

[12] The sum of these firms' exports adds up closely to total merchandise exports as reported by the Uruguayan Central Bank, with the annual difference always being less than 1 percent.

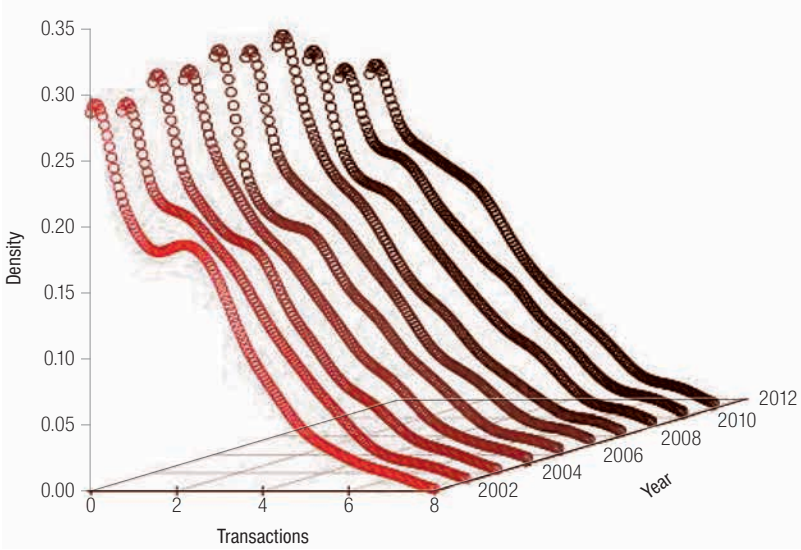
Figure 2.4 ■ Uruguay: Distribution of Exports, Average Exports, Number of Shipments, and Average Shipment Size, 2002–2011

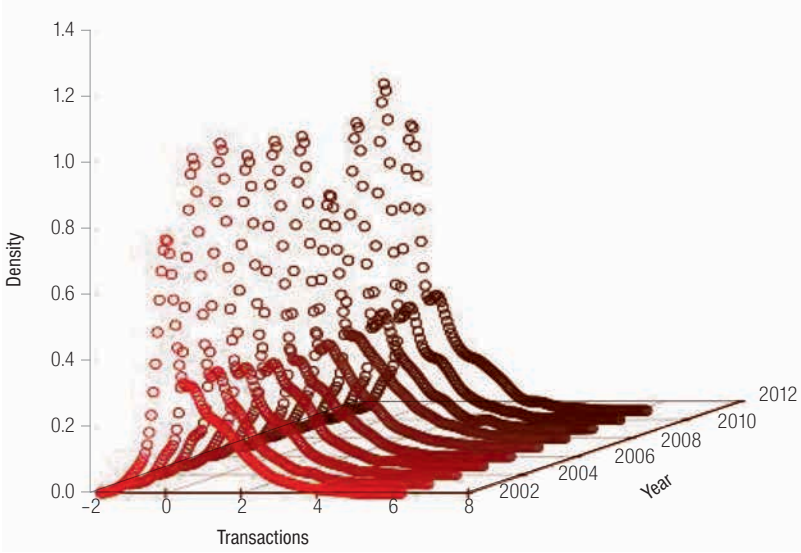




(continued)

Figure 2.4 ■ Uruguay: Distribution of Exports, Average Exports, Number of Shipments, and Average Shipment Size, 2002–2011 (*continued*)



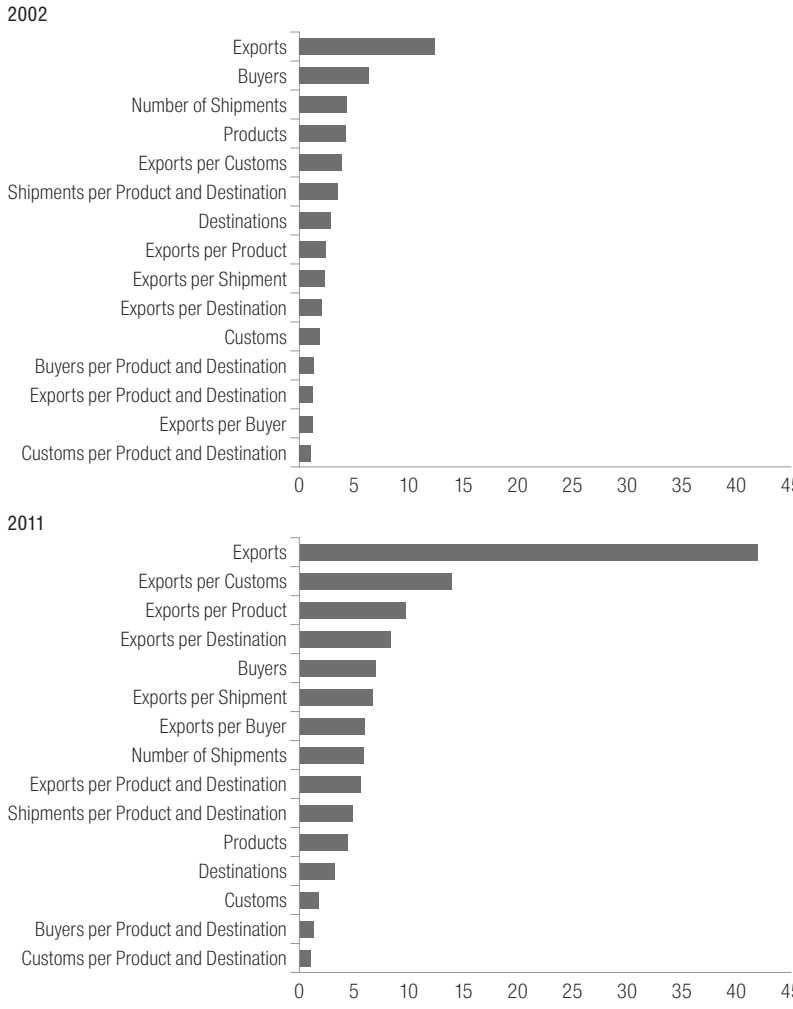


Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The figure shows the distributions of firms' (natural logarithm of) total exports, (natural logarithm of) average firms' exports per product and destination, (natural logarithm of) firms' number of shipments, and (natural logarithm of) average number of firms' shipment per product and destination for each sample year.

per product and destination, number of shipments, and average number of shipments per product and destination move to the right over time.[13]

Figure 2.5 characterizes the average Uruguayan exporter. On average, in 2011 exporting firms sold 4.4 products to 7 buyers in 3.3 countries

Figure 2.5 ■ Uruguay: Average Exporter, 2002 and 2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: Exports are reported in increments of US$100,000 (US$10,000 in the case of average exports per shipment).

[13] The figure shows the respective kernel density estimates.

for approximately US$4.2 million. In so doing, each of these firms made 59.6 annual shipments through 1.8 customs offices.

2.3.3 Customs Processing Times

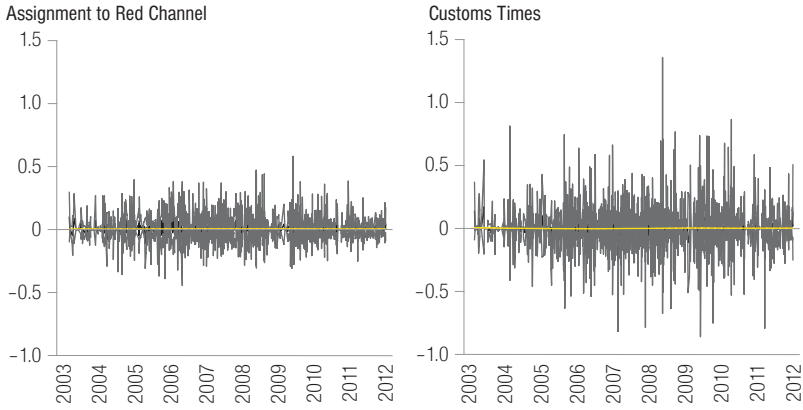
Customs clearance times are measured as the time elapsed between the request of the verification channel and the release of the goods by customs.[14] This precisely corresponds to the time it takes for customs agencies to carry out the verifications, if any, and hence, to the exact time that customs agencies adds to the time spent in moving between origins and destinations. Clearance times therefore exclude the time required for prior preparation of documents and for inland transportation, as well as that for port or airport handling. The reason is threefold. First, there is virtually no delay between the initial submission of the DUA by customs brokers and its registration by customs. Second, exporters may begin work on documentation while production is under way.[15] Third, several factors can affect the schedule of the domestic transport of goods to the exit point, and these factors are generally out of the control of customs agencies.[16]

2.3.4 Assignment to Customs Processing Channels

While the actual statistical model used by the DNA is not directly observable because it is strictly protected by tax confidentiality, according to interviews with customs officials and IDB customs specialists, exporting firms and product-destination combinations are the governing criteria in determining assignment to inspection in the particular case of exports. The reason is that these are the main sources of the risk that is being controlled for, specifically, misclassification of goods to avoid taxes or export prohibitions or misreporting of values for similar motives. Conditional on the aforementioned deterministic components, there is random assignment to verification channels.[17] Hence, the actual assignment mechanism can be mimicked such that, conditional on firms and product destinations, the

[14] Release and clearance times are used interchangeably here. The same holds for transactions and shipments.
[15] See Hummels (2007b).
[16] See WCO (2011).
[17] See URUGUAY XXI (2012).

Figure 2.6 ■ Uruguay: Correlation between Assignment to Verification Channels and Customs Times and Exports



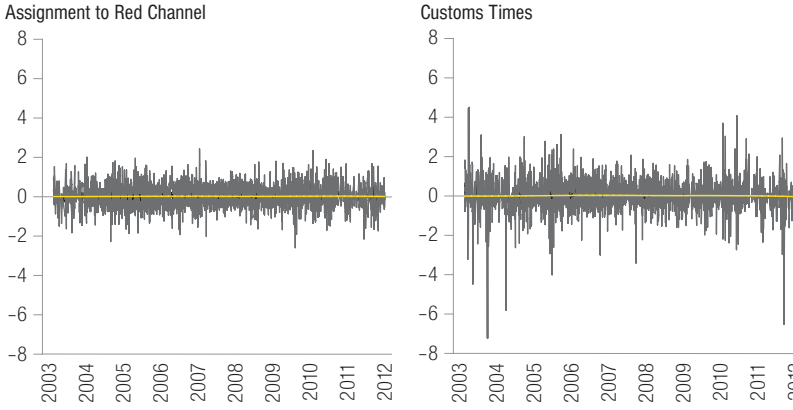
Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The figure shows the estimated coefficients (black line) and the confidence intervals (gray line) from daily regressions of a binary indicator of assignment to the red channel (left panel) and (the natural logarithm of) the customs times (right panel) on the value of the firm-product-destination flow, along with the respective smoothed values (yellow line). Firm and product-destination fixed effects are included. Only regressions with at least 20 degrees of freedom are reported.

customs information system randomly assigns shipments to the green or red channels.

Figure 2.6 shows that there seems not to be a systematic relationship between the size of the shipments and assignment to the red channel (left panel) or the time inspection takes (right panel) once firms and product-destination combinations are accounted for.[18] Figure 2.7 reveals that there is no association between successive channel assignments and customs times,

[18] In order to check this randomness, a binary indicator that takes the value of one if a firm-product-destination flow is assigned to the red channel and zero otherwise is regressed on a daily basis on (the natural logarithm of) the value of the flow and firm and (HS 6) product-destination fixed effects. The left panel of Figure 2.6 shows the estimates together with their confidence intervals along with the respective smoothed values obtained from a kernel-weighted local polynomial regression. As expected, these estimates are overwhelmingly nonsignificant. In particular, for the almost 1,000 regressions with at least 20 degrees of freedom, the estimated coefficient on the export value is insignificant in about 99 percent of the cases. If the previous estimations are redone using the (logarithm of the) median customs time instead of the binary assignment indicator as the dependent variable, the estimated coefficient on the export value is again insignificant in 99 percent of the cases. These are presented in the right panel of Figure 2.6.

Figure 2.7 ■ Correlation of Assignment to Verification Channels and Customs Times Over Time



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The figure shows the estimated coefficients (black line) and the confidence intervals (gray line) from daily regressions of a binary indicator of assignment to the red channel (left panel) and (the natural logarithm of) the customs times (right panel) on the value taken by the same variable the previous date the same firm-product-destination shipment went through customs, along with the respective smoothed values (yellow line). Firm and product-destination fixed effects are included. Only regressions with at least 20 degrees of freedom are reported.

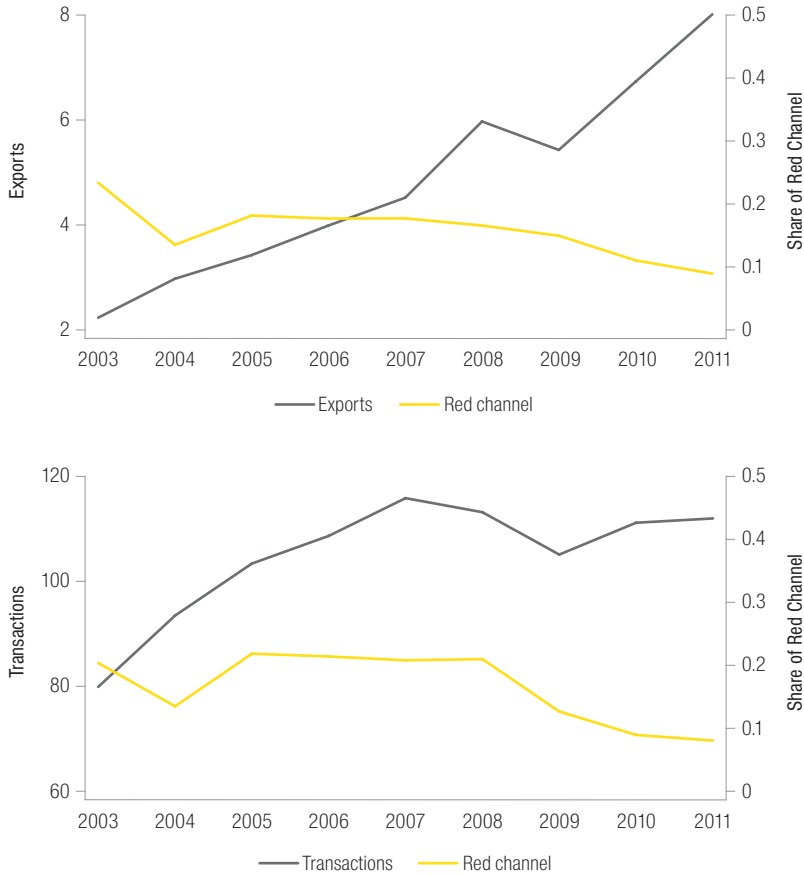
either.[19] Evidence presented in these figures can then be seen as confirming that assignment to intrusive examination can be taken as (conditionally) random. This is important from an impact evaluation point of view because it allows for ruling out the notion that "worse" transactions are selected for inspections and accordingly experience longer delays, which would generate a mechanical negative relationship between exports and customs clearance times.

[19] The time independence of assignment to verification channels is assessed by estimating a linear probability model in which the dependent variable is a binary indicator that takes the value of one if a firm-product-destination shipment on a given date is assigned to the red channel and zero otherwise, and the main explanatory variable is the value taken by the same indicator the previous date the same firm-product-destination shipment went through customs, along with firm and product-destination fixed effects for each date in the sample period. Potential interdependency among actual delays are explored by regressing the (natural logarithm of the) median customs time for a firm-product-destination shipment on a given date on the customs time for the same shipment the previous date it cleared customs. Estimates indicate that there is no systematic association between current and previous assignments to the red channel or between current and previous customs times, both conditional on firm and product-destination combinations. More specifically, the estimated coefficients on lagged assignment to the red channel and lagged customs times are insignificant 98.8 percent and 95 percent of the time, respectively (left and right panels of Figure 2.7).

2.3.5 Assignment to Customs Processing Channels and Times

Figure 2.8 shows the share of transactions processed through the red channel from 2002 to 2011. Roughly 15.2 percent of the transactions were subject to physical inspection over this period. This percentage share declined significantly in more recent years as a result of the

Figure 2.8 ■ Uruguay: Share of Exports and Shipments Assigned to the Red Channel, 2003–2011

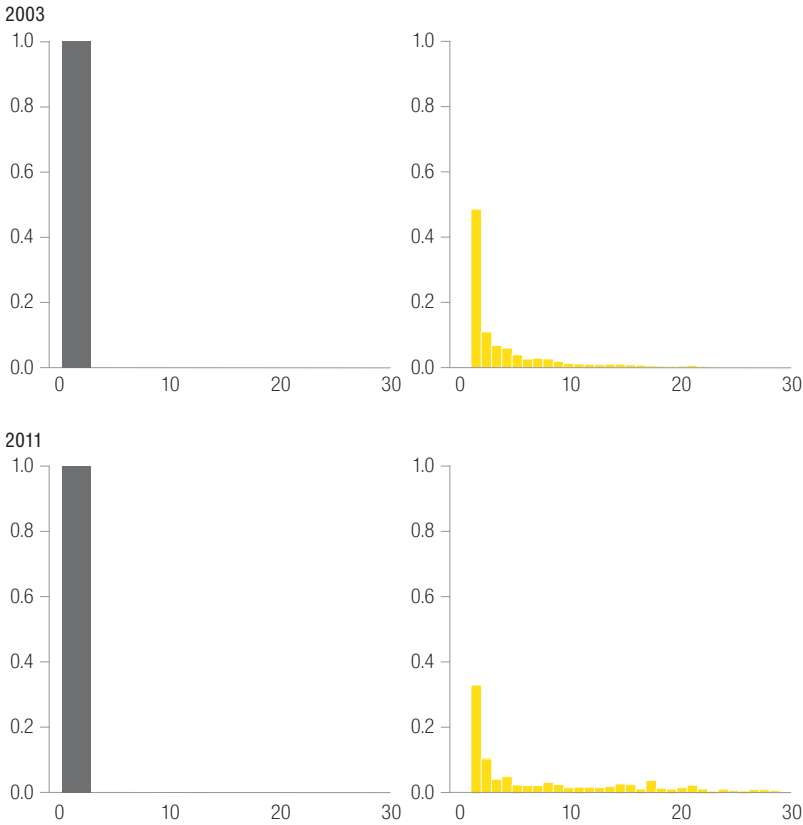


Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The upper panel shows Uruguay's total export values in billions of U.S. dollars (left axis) along with the percentage share of these values that were subject to physical inspection (right axis) over 2002–2011, whereas the lower panel reports Uruguay's total number of transactions (in thousands) (left axis) along with the percentage share of those transactions that were subject to physical inspection (right axis) over the same period.

incorporation of a risk management system. Thus, only 8.9 percent of the export value and 8.2 percent of the number of shipments were inspected in 2011 as opposed to 23.3 percent and 20.9 percent in 2003, respectively.

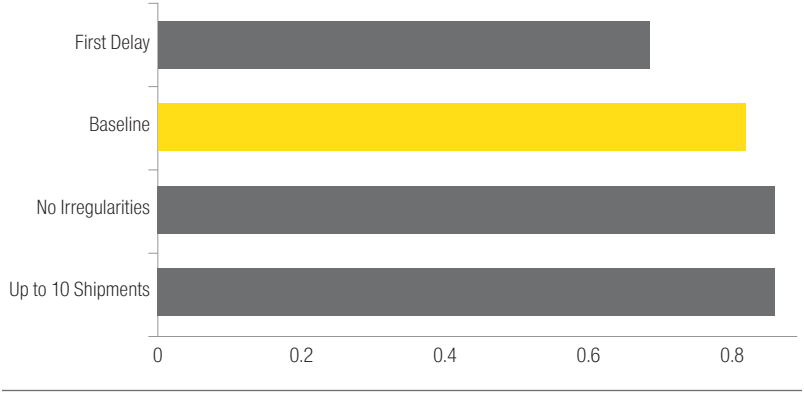
Shipments going through the green channel are always cleared within one day (i.e., the same day the broker requests the channel), whereas release of goods whose shipments were subject to the red channel can take one day or substantially longer. This can be seen in Figure 2.9, which

Figure 2.9 ■ Uruguay: Customs Processing Times, 2003 and 2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The figure shows the distribution of customs clearance times up to the 99.5th percentile (i.e., the highest 0.5 percentile is excluded) for shipments that were not subject/subject to physical inspection (dark gray and yellow bars, respectively) for 2003 and 2011.

Figure 2.10 ■ Uruguay: Assignment to the Red Channel and Customs Processing Times, 2002–2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The figure reports the response of the median number of days spent at customs to the median assignment to physical inspection for alternative samples. Baseline: Sample includes all observations. First Delay: Sample is limited to green and first-time red-channeled export flows. No Irregularities: Sample excludes firm-level export flows with irregularities. Up to 10 Shipments: Sample excludes exports flows with more than 10 shipments.

presents the distribution of the number of days spent in customs over all shipments for both 2003 and 2011.[20]

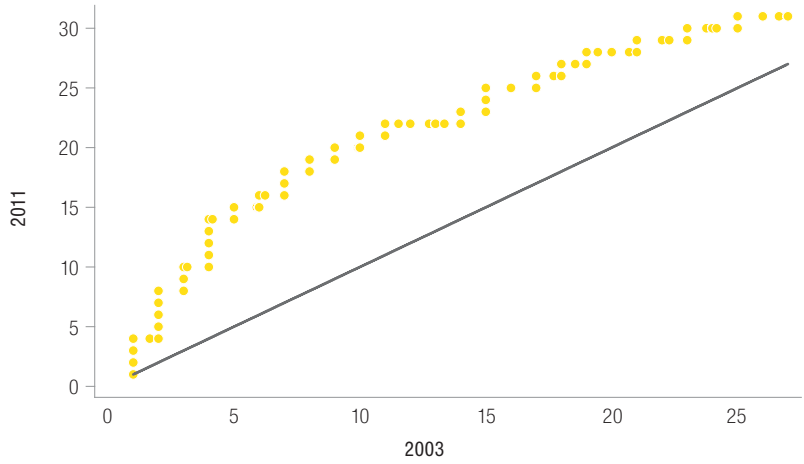
This can be more precisely examined by computing the correlation between customs processing times and the assignment to the red channel after accounting for the main risk factors, namely, the firms and the product-destination combinations over time.[21] Estimates suggest that there is a positive and significant relationship between the time spent at customs and the frequency of intrusive inspections. This also holds when the sample is limited to green and first-time red-channeled export flows, when firm-level export flows with irregularities are excluded, and when export flows with more than 10 shipments are dropped (Figure 2.10).[22] Specifically, in the case of Uruguay, evidence (weakly) suggests that time-sensitive and differentiated products would be less likely to be assigned

[20] The figure shows one histogram for each year.

[21] The relationship is estimated by regressing the change in (the natural logarithm of) the median number of days spent in customs (across shipments) on the change in the median assignment to the red channel (also across shipments), along with firm-year and product-destination-year fixed effects on data at the firm-product-destination-year level.

[22] For these shipments, by the law of large numbers, assignment to the red channel should be closer to the respective expected values.

Figure 2.11 ■ Uruguay: Customs Processing Times under the Red Channel, 2003 versus 2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The figure shows the distributions of customs clearance times under the red channel in 2003 and 2011 up to the 99.5th percentile (i.e., the highest 0.5 percentile is excluded).

to the red channel and, conditional on being physically inspected, the time that shipments of these goods spend in customs tends to be shorter.[23]

Customs times can substantially change over time. In fact, the median clearance time for those transactions assigned to the red channel increased from 2 to 5 days between 2003 and 2011. More generally, as illustrated by Figure 2.11, the distribution of these times saw a substantial shift toward higher values between these years.[24]

Both the share and the absolute number of transactions subject to material inspection declined in recent years (Figure 2.8). This suggests that increased customs processing times cannot be traced back to the expansion in the number of export shipments registered over this period. Instead, the

[23] The classification proposed by Rauch (1999) is used to distinguish between differentiated and non-differentiated goods. The former include both homogeneous goods, which are internationally traded in organized exchanges, and reference-priced goods, which are not traded in these organized exchanges but have reference prices quoted in specialized publications. Differentiated goods are not traded in organized exchanges and do not have reference prices, i.e., prices do not convey all the relevant information for international trade of these goods.

[24] The figure is a quantile-quantile plot.

reduction in the number of employees who carry out the verifications of export shipments is likely to have played a role in this development. This number decreased 30 percent from 2003 to 2011, primarily because of the pensioning of employees who reached retirement age and the fact that there was basically no hiring due to the 1995 public administration law that froze hiring of public employees to a significant extent for a number of years. More specifically, estimates reveal that a 10 percent reduction in the number of inspectors was associated with a 5.8 percent increase in the median number of days spent in customs for shipments assigned to the red channel over this period.[25]

Summing up, evidence presented in this section highlights that single dimensional figures can hide an ample variability of customs processing times, which may potentially have significant and heterogeneous implications for firms' export outcomes and their dynamics. Further, these times are largely driven by assignment to inspection channels, which is primarily random conditional on firm and product-destination combinations. Taking these facts into account is crucial to appropriately estimate the impact on trade of times spent in customs.

2.4 The Impact of Customs Processing Times on Exports: Evidence from Uruguay

2.4.1 Baseline: What Are the Effects of Customs Processing Times on Exports?

A naïve approach to quantifying the impact of customs processing times on foreign sales would be to compare firms' exports at the product-destination level processed under the green channel and thus released within the same day with those of their counterparts processed under the red channel and subject to actual delays, i.e., released in more than one day. This is done in Figure 2.12 for 2011.[26] The distribution of green channel exports is clearly

[25] This estimate is based on a regression of (the natural logarithm of) the customs times under the red channel on (the natural logarithm of) the total number of officials conducting physical inspections at individual customs offices over 2003–2011, along with customs offices and year fixed effects.

[26] The figure presents kernel density estimates of the distribution of both noninspected exports and exports physically inspected and thus facing increased customs processing times.

Figure 2.12 ■ Uruguay: Customs Processing Times and Exports, 2011

Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA).
Note: The figure presents the distribution of exports that are not physically inspected and thus released within the same day (dark gray curve) and exports physically inspected and facing increased customs times (yellow curve) for 2011.

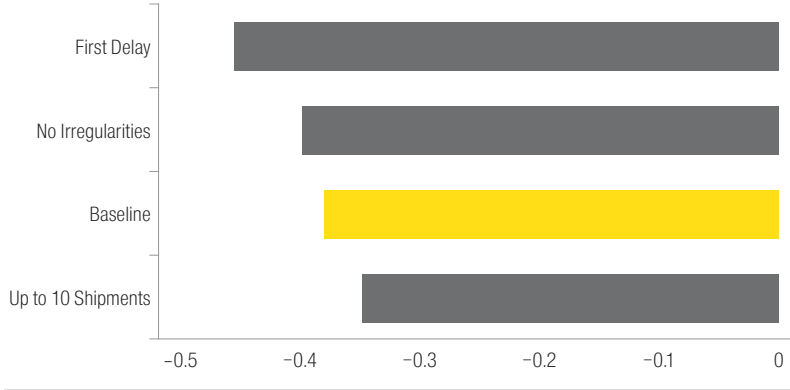
to the right of that corresponding to red channel exports, which indicates that exports experiencing delays were smaller than exports not delayed.[27]

Of course, this comparison may yield a poor measure of the impact of customs clearance times because such differences in exports might stem from systematic differences between firms or product-destinations across the groups being compared.

More precisely, as when combined with port handling times to evaluate their effects on imports (see Chapter 1), quantifying the effect of customs times on firms' exports requires addressing methodological issues. These issues can take the form of reverse causality (i.e., larger shipments may take longer to clear customs) and simultaneity (i.e., shipments from less-well-prepared firms are likely to spend more time in customs and be less demanded abroad), which can result in biased estimates of such effects. In order to avoid these biases, it is necessary to use a variable that is not subject to the same problems. More precisely, this variable should affect customs times but have no impact on firms' exports other than

[27] According to the Kolmogorov-Smirnov test-based procedure proposed by Delgado, Fariñas, and Ruano (2002), the distribution of noninspected exports stochastically dominates the distribution of inspected exports.

Figure 2.13 ■ Uruguay: Impact of Customs Processing Times on Firms' Exports, 2002–2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA). Estimates presented in this figure are reported in Tables 2 and 3 in Volpe Martincus, Carballo, and Graziano (2015, 2016).
Note: The figure reports the estimated percentage change in export values in response to a 1 percent increase in customs processing times for alternative samples. Baseline: Sample includes all observations. First Delay: Sample is limited to green and first-time red channeled export flows. No Irregularities: Sample excludes firm-level export flows with irregularities. Up to 10 Shipments: Sample excludes exports flows with more than 10 shipments.

through these times. Assignment to customs verification channels is the ideal candidate. As has been discussed previously, assignment to physical inspection drives the time spent at customs, only has an influence on exports through these times, and is essentially random once time-varying firm and product-destination characteristics are controlled for. It is therefore not subject to the issues referred to earlier. This variable is thus used as a source of variation in (i.e., an "instrument" for) customs times that allows their effects on exports to be correctly identified.[28]

Evidence based on this empirical approach indicates that customs times have a significant negative effect on exports (yellow bar in Figure 2.13). In particular, exports decline by 3.8 percent in response to a 10 percent increase in customs times. As shown in Figure 2.13, this estimated impact is robust to considering alternative samples.[29]

[28] The baseline equation is estimated on data at the firm-product-destination-year level. The dependent variable is the change in (the natural logarithm of) the export value and the main explanatory variable is the change in (the natural logarithm of) the median number of days spent at customs, along with firm-year and product-destination-year fixed effects. The median assignment to the red channel is used as an instrument for the median customs times.

[29] It is worth mentioning that this result is also robust to using alternative specifications (Volpe Martincus, Carballo, and Graziano 2015, 2016).

2.4.2 The Value of Risk Management and Expedited Processing

A back-of-the-envelope calculation reveals that, if all exports had been physically inspected and such inspections had taken two days, total exports in 2011 would have been 16.4 percent smaller than they actually were.[30] This provides a simple, direct measure of the benefits of having risk-based inspection procedures as opposed to manually inspecting every single shipment as used to be done in certain countries.[31] In addition to the actual coverage of the controls, their speed also matters. In this sense, if all shipments that were subject to the red channel and spent more than two days in customs had been released within two days, total foreign sales in 2011 would have been 3.6 percent larger.[32] Further, if these shipments had been authorized to leave customs within one day, as those processed under the green channel were, exports would have been 5.9 percent larger. This latter export response is far from negligible as, for instance, it corresponds to more than six times the annual budget allocated to Uruguay's national customs agency (DNA) and more than 100 times the annual budget of Uruguay's national export promotion organization (URUGUAY XXI). Nevertheless, the estimates are still smaller than those estimated from aggregated data.[33]

Even more specifically, the estimated relationship between median times at customs offices and personnel at the respective offices reported in Section 2.3 can be used to compute the approximate costs that the customs agency would have to incur to eliminate the excess delay for all shipments

[30] This simulation assumes that there are no cross-effects, i.e., decreased exports of a product to a destination by Uruguayan firms experiencing longer customs times are not offset by increased exports of the same product to the same destination by other Uruguayan firms not suffering from such delays. This is consistent with what is observed when estimating an expanded version of the baseline equation in which the median customs times faced by other firms selling the same product to the same destination is included as an additional explanatory variable.

[31] There might be a partially compensating effect. Controlling all shipments might potentially induce exporters to better prepare their shipments and the associated documentation, which could reduce the share of shipments with irregularities and thereby the time in customs.

[32] Two days was the customs time reported by the Doing Business indicators in 2011.

[33] According to estimates reported in Djankov, Freund, and Pham (2010), a 10 percent increase in a country's time to trade is associated with a 4 percent reduction in its total exports under the assumption that only own time to trade matters. Based on the estimates reported here, export losses generated by such an increase in time to trade would amount to 2.8 percent.

going through the red channel[34] Based on this figure, customs would have to increase the number of specialized inspectors by 170 percent. Given the export response referred to above and the average remuneration of these customs officials, the implied benefit/cost ratio of such an action would be roughly 100.[35]

2.4.3 The Channels: How Do Customs Processing Times Affect Exports?

Figure 2.14 disentangles the channels of observed export effects of customs times. These times have mainly affected the number of shipments and thereby the quantity shipped as well as the number of buyers, the number of shipments per buyer, and the average value and quantity of exports per buyer. This is consistent with findings in the literature that exporters react to increases in per-shipment costs by reducing shipping frequency.[36] Nevertheless, customs times have influenced neither the unit values nor the size of the shipments in terms of value or quantity.[37]

2.4.4 The Distributional Angle: Are the Export Effects Heterogeneous across Buyers, Products, and Destinations?

Buyers

It might be argued that, under perfect information, customs-driven delays that can be traced back to (conditional) random assignment to customs verification channels might not, or perhaps even should not, have any significant impact on exports. However, buyers are probably not perfectly

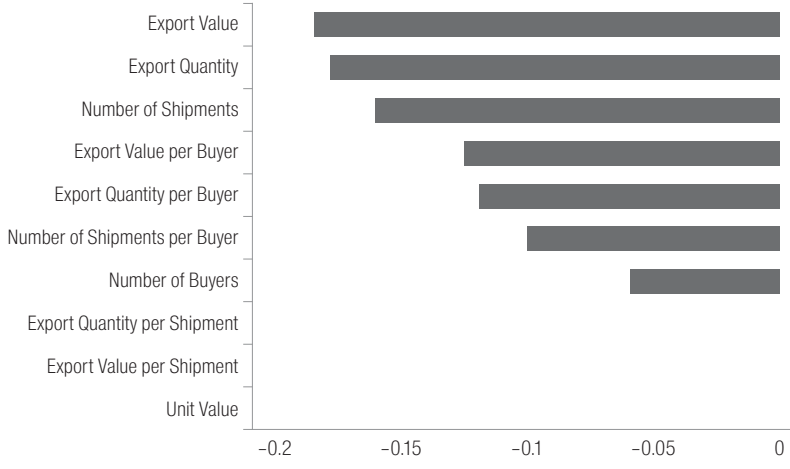
[34] It is hereby assumed that the share of inspected shipments is an appropriate target and that the productivity of officials in inspecting is constant and uniformly distributed, so that there are no productivity differences between those who would be newly hired and those who are already working at customs. Clearly, this productivity might actually be increased through proper training and incorporation of more effective inspection technologies. Alternatively, personnel might be reassigned across functions. However, this would require those oficials who are currently in other areas to already have (or to be able to easily acquire) the skills needed to effectively carry out inspections.

[35] Given the limitations that typically affect these kinds of calculations, these indicative figures should be viewed with caution.

[36] See Hornok and Koren (2015a).

[37] Hornok and Koren (2015a) find a positive impact on the size of the shipment. However, they are not able to distinguish among firms.

Figure 2.14 ■ Uruguay: Impact of Customs Processing Times on Firms' Exports, Channels, 2002–2011

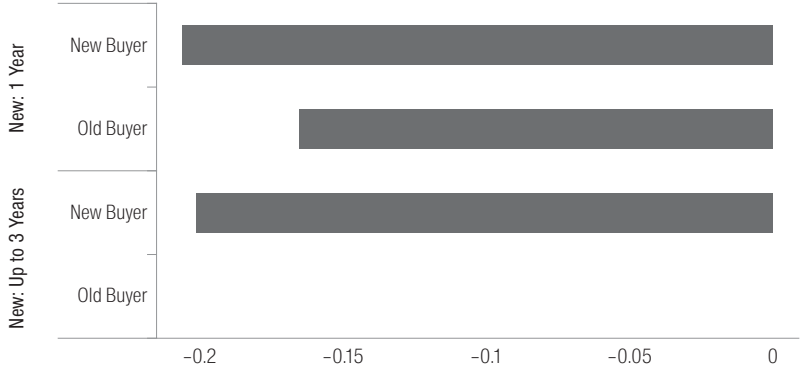


Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA). Estimates presented in this figure are reported in Table 7 in Volpe Martincus, Carballo, and Graziano (2015, 2016).
Note: The figure reports the estimated percentage change in export values, export quantity (weight), number of shipments, export value per shipment, export quantity per shipment, number of buyers, export value per buyer, export quantity per buyer, number of shipments per buyer, and unit value in response to a 1 percent increase in customs processing times. Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

informed about the causes of delivery delays. In particular, it is hard for them to establish whether these delays are the fault of firms themselves or the fault of factors beyond firms' control, such as customs intervention. As long as repetitive interactions are associated with increased information for and on trading partners, this is more likely to be the case and to matter more for commercial relationships at their initial stages. Such an imperfect information hypothesis can be informally assessed by making use of the data on the specific foreign companies to which Uruguayan exporters sell that is included in the database. More precisely, it is possible to distinguish between new buyers (i.e., importing companies that bought for the first time from the exporting firm in the years in question or that began to buy from this firm at most three years ago) and older buyers (i.e., importing companies that were already buying from the exporting firm before).[38] As expected, these groups of buyers have substantially different levels

[38] In order to ensure comparability, only firm-product-destination-year exports that simultaneously have new and old buyers are considered.

Figure 2.15 ■ Uruguay: Impact of Customs Processing Times on Firms' Exports, by Buyer Types, 2002–2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA). Estimates presented in this figure are reported in Table 6 in Volpe Martincus, Carballo, and Graziano (2015, 2016).
Note: The figure reports the estimated percentage change in export values in response to a 1 percent increase in customs processing times, both for new buyers (i.e., buyers that have entered a commercial relationship with the exporter in question the previous year or up to three years ago) and old buyers (i.e., buyers that have entered a commercial relationship with the exporter in question more than one year or more than three years ago). Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

of interaction with their providers. More specifically, exporter-importer pairs whose relationship is one (three) year(s) old interact on average only 2.3 (9) times, whereas those whose commercial links are older than one (three) year(s) accumulate 61.1 (98.7) interactions.[39]

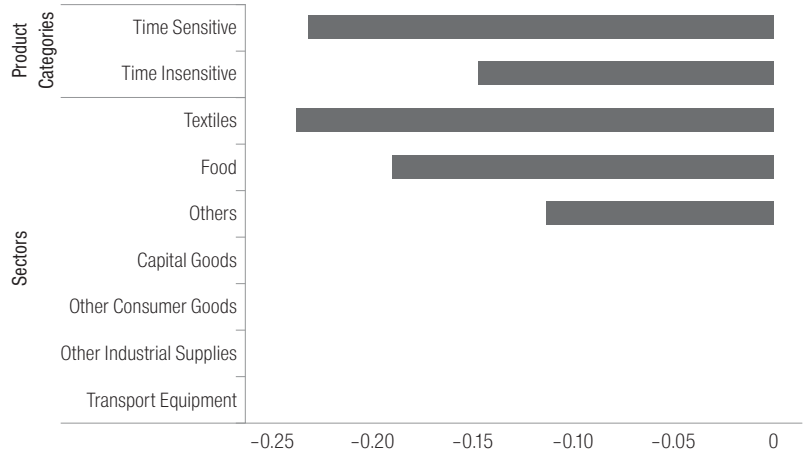
Figure 2.15 reports the estimated effects of customs processing times for different groups of buyers. The impact of these times varies depending on how mature the buyer-seller relationship is, with that impact being greater on exports to new buyers.[40] In fact, the effect vanishes for firm-firm commercial links that are older than three years.[41] These results might be seen as suggesting that imperfect information is actually mediating observed effects.

[39] Interactions are measured through the accumulated number of exporter-buyer specific shipments.

[40] Whether previous firm-product-specific experience instead of the overall experience with given exporting firms makes a difference has also been examined. As expected, effects tend to be smaller, although those on new buyers remain larger than effects on older buyers (Volpe Martincus, Carballo, and Graziano 2015, 2016).

[41] In the same vein, it is possible to differentiate between main buyers (i.e., the importing company that accounts for the largest share of exports) and secondary buyers (i.e., re-

Figure 2.16 ■ Uruguay: Impact of Customs Processing Times on Firms' Exports, by Product Categories, 2002–2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA). Estimates presented in this figure are reported in Table 8 in Volpe Martincus, Carballo, and Graziano (2015, 2016).
Note: The figure reports the estimated percentage change in export values in response to a 1 percent increase in customs processing times for time-sensitive goods and time-insensitive goods as classified using the estimation results from Hummels (2001) and for specific good categories (i.e., foods, textile, capital goods, other consumer goods, transport equipment, other industrial supplies, and other goods). Hummels (2001) analyzes how ocean shipping times and air freight rates affect the probability that air transport is chosen. In particular, the estimated effect of shipping times on the probability of selecting air transport is used for classification purposes, so that goods are identified as time-sensitive if the estimated coefficient on shipping time (i.e., days/rate ratio) of the respective 2-digit Standard International Trade Classification (SITC) is positive and significant.

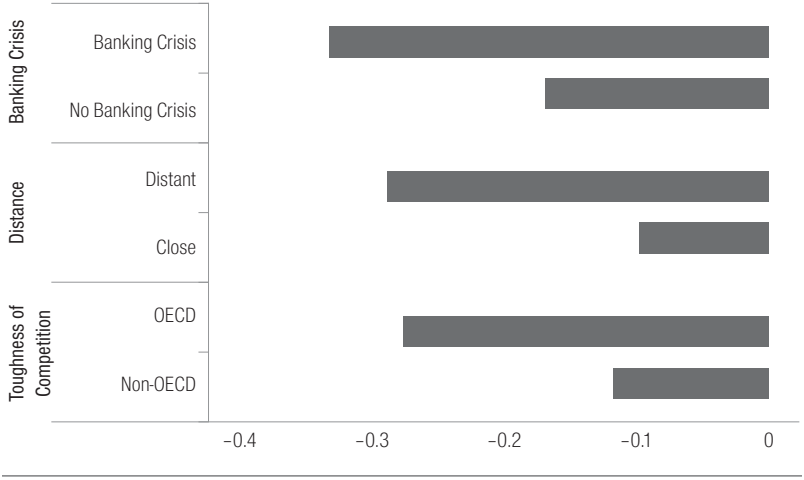
Products

Time matters for trade, particularly when goods are subject to rapid depreciation. This loss of value may be driven by spoilage (e.g., fresh produce), fashion cycles (e.g., shoes and garments), and technological obsolescence (e.g., consumer electronics).[42] It can therefore be expected that delays have stronger effects on these goods. In Uruguay, exported products classified as such include meat and meat preparations; travel goods and handbags; telecommunications and sound recording apparatuses; and professional, scientific, and controlling instruments. Estimates reported in Figure 2.16 confirm that the negative effects of increased customs times are generally

maining importing companies) in a given product-destination market. In this case, when restricting the sample to those firm-product-destination-year exports with two or more buyers, the effect of longer clearance times is significantly larger on exports to relatively less important customers.

[42] See Hummels (2007a).

Figure 2.17 ■ Uruguay: Impact of Customs Processing Times on Firms' Exports, by Group of Destinations, 2002–2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA). Estimates presented in this figure are reported in Table 9 in Volpe Martincus, Carballo, and Graziano (2015, 2016).
Note: The figure reports the estimated percentage change in export values in response to a 1 percent increase in customs processing times for OECD and non-OECD destinations; close destinations (i.e., countries whose distance to Uruguay is up to the median of the respective distribution) and distant destinations (i.e., countries whose distance to Uruguay is above the median of the respective distribution); and banking-crisis-affected and banking-crisis-free destinations as determined based on Reinhart and Rogoff (2011).

stronger on sales of time-sensitive goods. This is particularly the case with food and textile (clothing) products.

Destinations

Heterogeneous effects can also arise across destinations. Estimation results presented in Figure 2.17 distinguish between countries that are members of the Organization for Economic Cooperation and Development (OECD) and non-OECD countries. The results seem to suggest that the negative response of foreign sales to increased customs processing times is larger in destinations that are subject to more intense competition.[43]

[43] Building upon these results, it is possible to explore whether the impact of longer times in customs varies across product categories in the different destinations by combining the time-sensitive/time-insensitive and OECD/non-OECD breakdowns. From these estimates, it can be concluded that the negative effects of increased customs times are generally stronger on sales of time-sensitive goods to OECD countries. In contrast, there is virtually no impact on exports of time-insensitive goods to non-OECD countries.

Given Uruguay's location in the world, these results can capture effects of distance to relevant markets. This is corroborated by estimates reported in the middle rows of Figure 2.17. According to these estimates, effects are indeed larger as destinations become farther away. When effects are also allowed to differ along both the competition and distance dimensions, no asymmetries are observed across the former. More precisely, customs times do not have a greater impact on exports to distant OECD countries than to distant non-OECD countries. Hence, distance appears to be the primary factor behind the heterogeneous effects across destinations observed above.

Not only distance but also financial conditions in the destination countries can interact with customs times in shaping export behavior. In particular, during financial crises, the time between origins and destinations amplifies the negative impact of a higher probability of default on trade.[44] Putting it differently, time to ship increases the responsiveness of exports to the expected cost of default. The rationale is that exporters react by increasing their price and decreasing their export quantities and values more for importers at larger shipping times because, during a banking crisis, the probability that these importers will default on their payment obligations rises as time passes and hence with shipping time. Moreover, the opportunity costs of funds increase with transit lags and the interest rate, which can jump upward all of a sudden during those episodes.[45] The role played by these financial factors is examined by differentiating between destinations that suffer from a banking crisis in the year in question and those destinations that do not.[46] Consistent with previous findings, results shown in Figure 2.17 reveal that longer customs clearance times have a stronger impact on exports to countries experiencing banking crises.

[44] See Berman, de Souza, Martin, and Mayer (2013).

[45] Schmidt-Eisenlohr (2013) also shows that time to trade magnifies the impact of financing on trade. In particular, countries tend to trade less with each other the higher the financing costs, and even less so the more time is needed to trade (as proxied by distance). Similarly, Levchenko, Lewis, and Tesar (2011) argue that, if trade finance needs are positively related to the time it takes for shipments to reach their destination, those costs can be expected to increase with delivery delays and, accordingly, in those cases trade in sectors with longer lags fall the most.

[46] In making this distinction, Reinhart and Rogoff's (2011) dataset on financial crises over 1800–2010 is used. Results are identical when using instead an indicator based on Laeven and Valencia's (2012) database on systemic banking crises over 1970–2011.

Product-Destinations Combinations and Transportation Mode

Time also makes a difference when demand is uncertain, i.e., consumers prefer certain good varieties over others and their preferences change quickly over time.[47] If the time elapsed between ordering and delivery is long enough, the volume and composition of shipments must be decided upon well before the resolution of demand uncertainty, in which case forecasting errors will result in lost profitability because of inventory-holding costs or forgone business opportunities derived from oversupplying or undersupplying the market or mismatch between varieties offered and demanded.[48]

It has also been shown that exporters react to increased volatility by reducing their number of shipments (i.e., their frequency) and that this response is amplified by the time needed to serve the destination market from the origin country.[49] This literature highlights that exports from firms facing volatile demand are likely to be particularly affected by long delays because these create an important barrier to ex post adjustments to shocks.[50] In the current context, this implies that the negative effect of customs clearance times on exports would be magnified when demand is volatile.

This is confirmed by estimates shown in Figure 2.18, which indicate that the impact of customs times on exports is larger for product-destination combinations with more volatile demand.[51] Also consistent with previous findings that firms tend to rely more on air shipping the more

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[47] See Deardorff (2001).

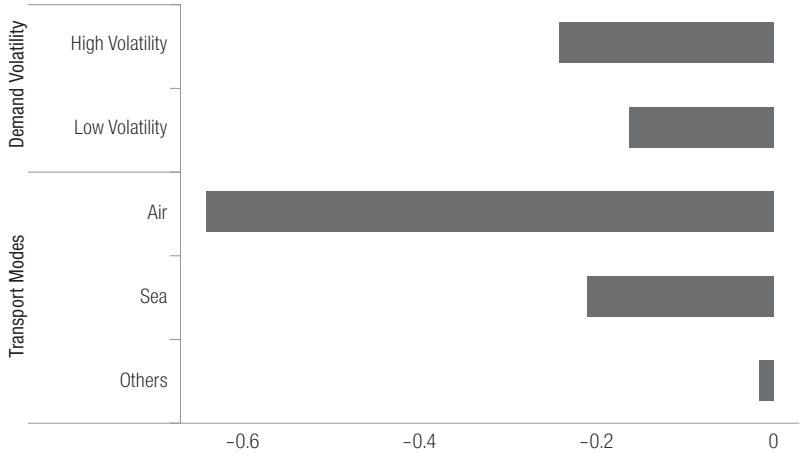
[48] See Hummels and Schaur (2013). A series of papers precisely analyze how the interplay between timeliness and demand uncertainty affects trade, location, and modal choice (Aizenman 2004; Evans and Harrigan 2005; Harrigan and Venables 2006; Hummels and Schaur 2010; Harrigan 2010). The main messages that come out of these papers is that, when timely delivery is important, firms tend to rely more on closer providers the higher their products' restocking rate; they resort more to air shipping the lighter the products are; and they co-agglomerate in the presence of vertical linkages.

[49] See Békés, Fontagné, Muraközy, and Vicard (2015).

[50] See Hummels and Schaur (2010).

[51] The volatility measure is calculated following Hummels and Schaur (2010). In particular, first, the median of the coefficient of variation of the quantities sold by each firm in the different transactions within a given year, averaged over 2000–2002, is computed for each product-destination pair. Second, an equation is estimated whereby the change in (the natural logarithm of) the median number of days spent in customs is interacted by a binary indicator that takes the value of one if the volatility of the demand in a particular product-destination combination computed as indicated before is at or above the median and zero otherwise.

Figure 2.18 ■ Uruguay: Impact of Customs Processing Times on Firms' Exports, by Level of Demand Volatility and Transportation Mode, 2002–2011



Source: Author's calculations based on data from Uruguay's customs agency (*Dirección Nacional de Aduanas* – DNA). Estimates presented in this figure are reported in Table 10 in Volpe Martincus, Carballo, and Graziano (2015, 2016).
Note: The figure reports the estimated percentage change in export values in response to a 1 percent increase in customs processing times for product-destination combinations with high demand volatility (i.e., the coefficient of variation of the quantities sold by each firm in the different shipments to each product-destination pair within a given year, averaged over 2000–2002, is above the median) and low demand volatility (i.e., the coefficient of variation of the quantities sold by each firm in the different shipments to each product-destination pair within a given year, averaged over 2000–2002, is up to the median) and for different transportation modes (i.e., air, sea, and others).

volatile the demand is, when exports are broken down by transportation mode the impact of increased time in customs is larger on those flows that are shipped by air (Figure 2.18).[52]

In addition to affecting continuing flows (export intensive margin), longer times spent at customs can also impact the presence of these flows (export extensive margin) and, specifically, may cause some exports to disappear. An examination of the effects of changes in customs clearance times on the firm-product-destination and firm extensive margins reveals that increased border times due to customs procedures have induced some firms to stop exporting certain products to certain destinations and even to stop exporting altogether.[53] Interestingly, longer times in customs appear to have primarily affected trade relationships with new

[52] See Hummels and Schaur (2010).

[53] The estimating equation has as a dependent variable a binary indicator that takes the value of one if a firm-product-destination export flow is present in the year in question and zero

buyers. This is consistent with the evidence found on the export intensive margin, thus also suggesting that imperfect information is likely to play an important role in accounting for the economic decisions driving observed results.[54]

To sum up, estimates presented in this section indicate that delays that originate in customs interventions can significantly affect firms' exports, particularly those to new commercial partners, those consisting of goods that are time-sensitive and have more volatile demand, and those that are directed to countries that are farther away or that suffer from banking crises. Such delays can even force some firms to exit international markets.

2.5 External Validity: How General Are these Effects? Evidence from Other Countries and on Imports

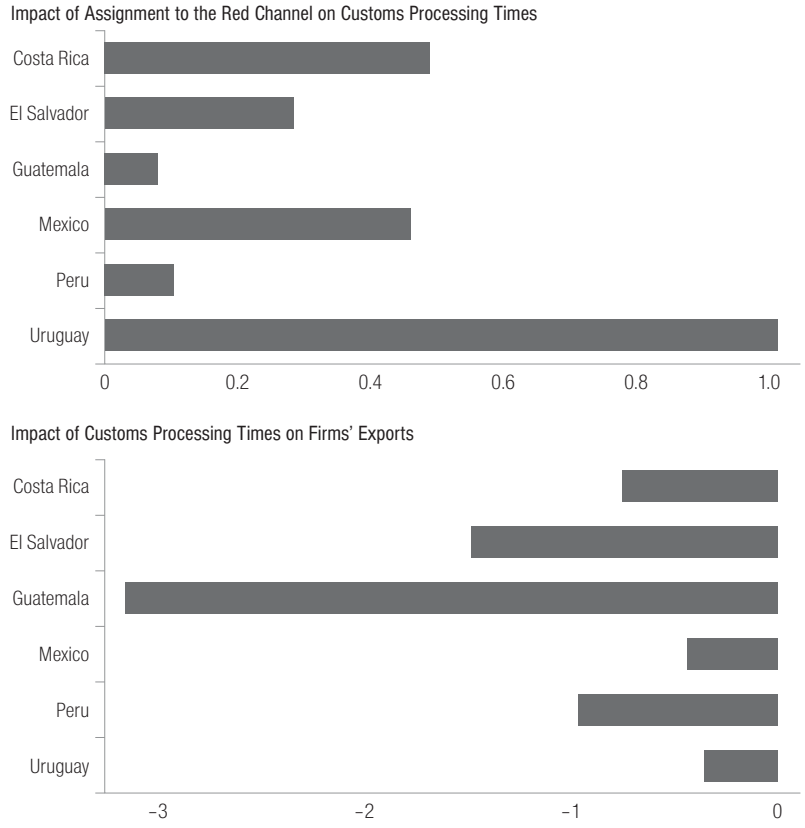
2.5.1 External Validity: Are the Observed Export Effects Exclusive to Uruguay?

Several countries in the region collect similar transaction-level data on firms' exports, imports, and customs clearance times and have kindly made them available for purposes of analysis. The countries are Costa Rica (2010–2013), Ecuador (only imports, 2007–2012), El Salvador (2002–2013), Mexico (2002–2014), Peru (2007–2013), and Uruguay (extended data for 2002–2015). The sample period is indicated in parentheses. Using these data,

otherwise, and as the main explanatory variable the change in (the natural logarithm of) the median customs processing times between the two previous years, along with firm-year and product-destination-year fixed effects. In addition, another variant of this equation is estimated at the product-destination level in which the dependent variable is the change in (the natural logarithm of) the number of firms exporting a given product to a given destination, and the main explanatory variable is the change in (the natural logarithm of) the respective median clearance times. Alternative specifications of this equation are considered. These specifications include different sets of fixed effects (i.e., destination-year fixed effects and product-year fixed effects) to account for unobserved factors.

[54] In this case, the dependent variable is a binary indicator that takes the value of one if an export flow at the firm-product-destination-type-of-buyer (new versus old) level is present in the year in question and zero otherwise, and the main explanatory variable is the change in (the natural logarithm of) the respective median customs processing times between the two previous years. Results are essentially the same regardless of whether presence if defined as all buyers of a type being present or at least one of them.

Figure 2.19 ■ Selected Latin American Countries: Impact of Assignment to the Red Channel on Customs Processing Times and Impact of Customs Processing Times on Firms' Exports, Various Years



Source: Author's calculations based on data from national customs agencies: DGA – Costa Rica, DGA – El Salvador, SAT – Guatemala, SAT – Mexico, SUNAT – Peru, and DNA – Uruguay.
Note: The upper panel reports the response of the median number of days spent at customs to the median assignment to physical inspection, while the lower panel presents the estimated percentage change in export values in response to a 1 percent increase in customs processing times.

the previous analysis has been reproduced for these countries. Figure 2.19 presents the effects of assignment to physical inspection on customs times (upper panel) and the impact of customs times on firms' exports, estimated using that channel assignment as a source of exogenous variations in those times (lower panel) for each of these countries over the respective sample

periods.[55] While there are differences in the size of the estimated effects across countries, they consistently suggest that longer times at customs as driven by more frequent intrusive examinations are associated with lower exports. Nonreported estimation results reveal that in all cases shipment frequency is the main channel through which this effect operates.

2.5.2 More on External Validity: Are Effects Exclusive to Exports?

Available data also allow for exploring how customs processing times affect imports. In this regard, it should be taken into account that, for imports, customs risk management systems typically use information on a set of variables that goes beyond the importing firm and the product-origin combination and includes the exporting firm, customs broker, and transport company, among other variables, to determine whether shipments have to be physically inspected. This is so because, unlike exports, several procedures take place and several agents are involved in imports before customs intervention, thus representing potential sources of risk. From the point of view of determining the impact of customs clearance times on imports, this is less a concern if, as can be seen in the data from Peru, firms tend to work with one customs broker or transport company, or if product-destination combinations are generally associated with a transport company.[56] Without certainty on this, results should be seen as being more indicative than conclusive. Bearing this caveat in mind, estimates are shown in Figure 2.20. These estimates corroborate that intrusive examinations by customs agencies affect clearance times, which in turn have a significant negative impact on import values. As before, this primarily operates along the shipment extensive margin.[57]

2.6 Summary and Conclusions

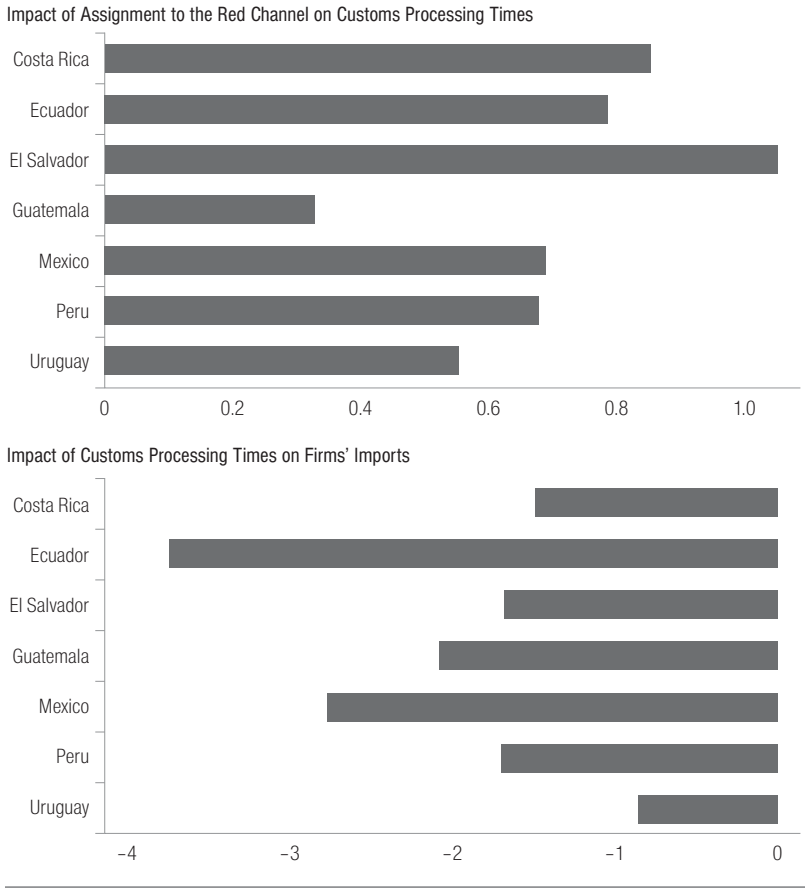
The evidence presented in this chapter indicates that customs-driven delays have a significant negative impact on firms' exports, and even

[55] In all cases, the methodological approach outlined for the case study on Uruguay is used. Results are similar if we estimate these effects over a common sample period (i.e., 2010–2013).

[56] In these cases, the role of the transport company and the customs broker would be accounted for by the firm-year and the product-origin-year fixed effects.

[57] Fernandes, Hillberry, and Mendoza Alcántara (2015) carry out a similar analysis and report similar findings for Albania.

Figure 2.20 ■ Selected Latin American Countries: Impact of Assignment to the Red Channel on Customs Processing Times and Impact of Customs Processing Times on Firms' Imports, Various Years



Source: Author's calculations based on data from national customs agencies: DGA – Costa Rica, SENAE – Ecuador, DGA – El Salvador, SAT – Guatemala, SAT – Mexico, SUNAT – Peru, and DNA – Uruguay.
Note: The upper panel reports the response of the median number of days spent at customs to the median assignment to physical inspection, while the lower panel reports the estimated percentage change in import values in response to a 1 percent increase in customs processing times.

on their countries' exports. This impact is more pronounced for sales to newer buyers of time-sensitive goods and to countries that are harder to reach or are experiencing a banking crisis. These effects can be traced back to a reduced number of shipments, and thereby a lower number of buyers and smaller exports per buyer, in terms of

both value and quantity. Further, some firms may be forced to stop exporting to certain markets. Finally, imports also suffer from longer times at customs.

This evidence conveys a clear message to customs agencies in Latin America and the Caribbean. Implementation of risk management systems—as opposed to material inspection of every single shipment—should be a key component of trade facilitation strategies. More specifically, these systems should make use of appropriate econometric techniques to exploit all available relevant information to improve the effectiveness of targeting and further facilitate trade by reducing intrusive examinations. This implies going beyond the information generated by customs information systems through the processing of past declarations and incorporating data from other agencies such as internal revenue services. An example is illustrative in this regard. By definition, new exporters, importers, and exporter-importer relationships do not have a track record with customs agencies and are therefore typically targeted by their risk management systems. This can be seen in Table 2.2, which reports whether firms that are new to trade or new trade flows at the firm-product-country level are more likely to be assigned to physical inspection in selected Latin American countries.[58] In general, assignments to intrusive examination fall more heavily on shipments from firms that started to operate internationally over the last three years, shipments that correspond to firm-product-country trade relationships initiated within the last three years, or both.

True, creating new firms is a usual practice among those involved in illicit trade, in general, and smuggling and drug trafficking, in particular.

[58] Table 2.2 is based on estimates of two equations that are estimated at the firm-product-country-year level. The dependent variable is a binary indicator that takes the value of one if the median shipment is assigned to the red channel (i.e., 50 percent or more of the shipments) and zero otherwise. The main explanatory variables are a binary indicator that takes the value of one if the firm started to trade the current year (or the current year or previous year or the current year, the previous year, or the year before) and zero otherwise, along with firm-product-country and product-country-year fixed effects ("new firms") or a binary indicator that takes the value of one if the firm started to trade in the product-country combination in question the current year (or the current year or previous year or the current year, the previous year, or the year before) and zero otherwise, along with firm-product-country, firm-year product-country-year fixed effects ("new firm-product-country"). Note that there are several significant effects despite the fact these specifications are very demanding, especially because many firms only trade one year or multiple flows are traded just one year.

Table 2.2 ■ Selected Latin American Countries: Are New Firms and New Flows Targeted by Customs Agencies' Risk Management Systems?

Likelihood to be Assigned to Physical Inspection		
Exports		
Country	**New Firm**	**New Firm-Product-Country**
Costa Rica	No	No
Ecuador	Yes	No
El Salvador	No	Yes
Guatemala	Yes	No
Mexico	Yes	Yes
Peru	Yes	Yes
Uruguay	Yes	Yes
Imports		
Country	**New Firm**	**New Firm-Product-Country**
Costa Rica	No	Yes
Ecuador	Yes	No
El Salvador	Yes	Yes
Guatemala	Yes	No
Mexico	Yes	Yes
Peru	No	Yes
Uruguay	Yes	No

Source: Author's calculations based on data from national customs agencies; DGA-Costa Rica, SENAE-Ecuador, DGA-El Salvador, SAT-Guatemala, SAT-Mexico, SUNAT-Peru, and DNA-Uruguay.
Note: The table informs whether new trading firms or new firm-product-country flows are subject to more intrusive examinations by customs agencies. "Yes" indicates that shipments from new-to-trade firms or new firm-product-country flows are significantly more likely to be assigned to physical inspection in at least one of the possible definitions of "new," namely, observed for the first time the current year; the current year or previous year; or the current year, the previous year, or the year before. "No" indicates that shipments from new-to-trade firms or new firm-product-country flows are not significantly more likely to be assigned to physical inspection than the older counterparts in any of the possible definitions of "new," namely, observed for the first time the current year; the current year or the previous year; or the current year, the previous year, or the year before.

However, not all new trading firms are the same. Among new exporters or importers, there may be many firms established several years ago with a perfectly clean tax and social security record. If customs agencies only use data in their systems and do not make use of this additional information from other public entities, these companies will be seen as being as risky as those just created and accordingly will be subject to the same treatment. As shown in this chapter, this is non-neutral for trade, since

longer customs clearance times are particularly harmful for new trade relationships.[59] This can even specifically countervail the effect of activities by other agencies, such as those tasked with trade promotion, that are precisely directed toward expanding and diversifying exports through the establishment of new commercial links. In fact, merged trade, export promotion, and customs processing time data reveal that, on average, 14 percent (75 percent) of the new (all) Peruvian exporting firms assisted by PROMPEX/PROMPERU over 2001–2014 had shipments assigned to physical inspection. Figures are comparable in Uruguay, where on average 16 percent (57 percent) of new (all) exporting firms supported by URUGUAY XXI had transactions inspected over 2010–2015. Further, indicative evidence suggests that the positive impact of trade promotion assistance on firms' exports was indeed smaller when their shipments got delayed due to customs inspections in Peru and weakened enough as to not even be significant in Uruguay.[60]

Moreover, monitoring can and should be done in an expedited manner, so that no substantial increase in border times occurs relative to those shipments exempted from physical control. This requires endowing customs agencies with proper personnel and technological means. However, caution is needed in moving in this direction. Expediting should by no means come at the expense of the quality of verifications. In other words, the time that controls require should be minimized whenever possible, but always subject to the condition that their goals are actually achieved. In addition, as has already been done by some export promotion agencies, training on export process formalities can be provided to firms without previous trade experience to minimize delays caused by unintended mistakes in filling out customs documents.[61]

[59] According to interviews with several practitioners, this illicit trade-driven creation of new firms usually involves a given set of individuals. Information on the owners and managers, potentially linked with records from other public agencies, could then also be used as one of the channel assignment criteria to reduce the incidence of these practices.

[60] This statement is based on fixed-effect estimations using firm-year level data, whereby (the natural logarithm of) a firm's export is regressed on a binary indicator that takes the value of one if the firm was assisted by the trade promotion agency in the year in question and zero otherwise, and this variable interacted by a binary indicator that takes the value of one if the firm had shipments subject to intrusive examination and zero otherwise, along with firm and year fixed effects. Standard errors are clustered by firm for inference purposes.

[61] See Volpe Martincus (2010).

>> Trustworthiness Makes a Difference at the Border and Beyond: Authorized Economic Operators

3

3.1 Security and International Trade: Yesterday and Today

In days gone by, buyers would board a ship and travel overseas, identify the goods they were looking for, pay for them, load the goods onto the ship, return to their home country aboard the ship with their goods, unload the goods, pay the customs duties, and sell the goods in the domestic market.[1] Today, international trade transactions are far more complex. The number of operations is substantially larger and so is the number of actors involved. International trade has increased four times as a share of global output since the early 1950s.[2] To a significant extent, this has been driven by increasing vertical specialization and the consequent emergence of supply chains that involve multiple border crossings and several economic agents spread across different jurisdictions.[3] Importantly, their transactions are accordingly subject to several concurrent (national and international) security regimes that resemble the "spaghetti bowl"

[1] See Hesketh (2010).

[2] See Saito, Ruta, and Turenen (2013).

[3] See Hummels, Ishii, and Yi (2001). De Backer and Miroudot (2014) and Miroudot and Nordström (2015) show that the length of supply chains increased in recent decades both in terms of the number of production stages and the implied sourcing distance, the latter at an average pace of 40 kilometers a year.

of preferential trade agreements.[4] In particular, the seller, who knows exactly what is being shipped, is outside the jurisdiction of the importing country's border agencies, so these agencies generally turn to the carrier, whose information is not always accurate, and hold the importers legally accountable for goods they have probably never seen.[5] The complexity of this network of international trade transactions has profound security implications. In particular, specific actions by individual actors became less visible; the potential for security breaches associated with terrorism or in the form of drug and contraband smuggling is higher; and, as the terrorist attacks on the United States in September 2001 demonstrated, the consequences can be dramatic.

In the aftermath of these attacks, the United States and other countries around the globe began to recognize the need to address these potential vulnerabilities associated with the configuration of supply chains by means of tighter security measures while facilitating licit trade.[6] International efforts resulted in the WCO's SAFE Framework of Standards to Secure and Facilitate Global Trade in 2005. The SAFE framework provides customs administrations with a procedural model and a series of standards to facilitate the movement of goods through secure international trade supply chains based on the establishment of cooperative arrangements between border agencies and between these agencies and the private sector.[7] It encompasses four main elements: harmonization of information requirements; use of a consistent risk management approach; carrying out outbound inspection of high-risk cargo, ideally with nonintrusive methods upon the request of receiving nations (with a comparable risk-targeting methodology); and granting of (customs) advantages to firms that meet certain supply-chain security standards.

More specifically, border agencies have reacted to increased security threats by introducing tighter border control measures. Given that these measures could create additional costs for firms and thereby negatively affect their trade, these agencies have simultaneously implemented various initiatives to facilitate licit trade in this new context.[8] Supply

4 See Grainger (2007).
5 See Hesketh (2010).
6 See Aigner (2010) and Altemöller (2011).
7 See Tweddle (2008) and Aigner (2010).
8 See Mirza and Verdier (2014).

chain security-motivated programs for "trustworthy firms" referred to as Authorized Economic Operators (AEOs), stand out in this group of initiatives. Detailed provisions for these programs were incorporated into the SAFE framework in 2007. These streamlined and consolidated national initiatives started with the U.S. Customs-Trade Partnership Against Terrorism (C-TPAT) launched in 2002, followed by the European Union's AEO with the amendments of the Community Customs Code in 2005 and 2016.[9] Whether these kinds of programs actually make a difference in terms of foreign trade is unknown. This chapter sheds light on this issue by examining Mexico's AEO program, known as the New Scheme for Certified Firms (*Nuevo Esquema de Empresas Certificadas* – NEEC).

3.2 Authorized Economic Operator Programs

AEO programs, which are also covered in the 2013 WTO Agreement on Trade Facilitation, are cooperative arrangements between customs agencies and other public border entities and private sector firms that seek to extend controls up and down the supply chain by focusing on ex ante evaluation of firms' premises, practices, procedures, and documentation instead of focusing on ex post checking of their individual shipments.

Participation in an AEO program is voluntary. In order to get the respective certification, firms have to apply to customs administrations and are subject to an exhaustive auditing process. In general, eligibility criteria include a record of compliance with customs requirements; a satisfactory system of managing commercial records and, whenever applicable, transport records that allow for appropriate customs control; proven financial solvency; and, crucially, adequate security and safety standards. Firms satisfying these criteria are considered reliable and can become AEOs. In short, AEOs are firms certified by the national

[9] See Laden (2007) and Altemöller (2011). Another leading initiative in the United States was the Container Security Initiative, which provides for the identification of high-risk containers, a nonintrusive inspection (x-ray) of suspicious containers, and the use of security devices that make it possible for customs officers to determine whether the containers were opened while in transit and their load manipulated (Altemöller 2011).

customs administration as complying with relevant supply-chain security standards based on a comprehensive scrutiny of their plants and their tax and customs behavior.

Firms that satisfy these criteria are entitled to trade facilitation advantages.[10] Among others, these advantages consist of less frequent physical and documentary customs inspections, as the firms are assigned a lower risk score in the customs risk management system; expedited processing and release of shipments, which specifically involves priority treatment when selected for inspection as well as priority during periods of elevated threat conditions or in post-incident resumptions; and streamlined administrative compliance procedures through the use of simplified customs declaration forms. All these advantages, in principle, translate into shorter clearance times at the border, lower per-shipment costs and trade costs in general, and thereby increased shipping flexibility. This is likely to provide certified firms with a competitive edge.

In addition, AEO certification can serve as a mark of "quality" in the sense that it serves as a signaling mechanism that reduces information barriers. More specifically, AEO status indicates that the firm, apart from being reliable in traditional customs and financial terms, is also compliant with security and safety standards and can therefore be considered a "secure" trader and thus a reliable trading partner.[11]

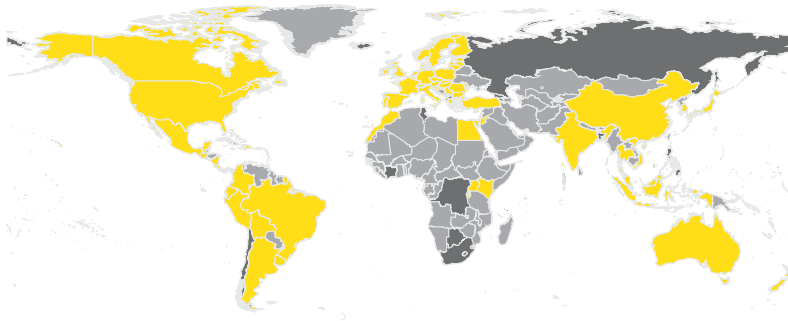
However, obtaining AEO status is not free. The cost of certification varies across firms, depending primarily on the extent of the improvements they have to make to meet the safety and security eligibility criteria and the size of their facilities, among other considerations. According to a recent IDB survey of approximately 140 Latin American AEO firms, certification costs range from less than US$5,000 to more than US$1 million, with a median value of US$22,500.[12] As with any certification, maintaining the status also involves costs (e.g., security personnel, maintenance costs of security devices such as cameras, annual membership fees when applicable, as in Mexico, etc.). The same survey revealed that these maintenance costs could be as low as US$2,000 and as much as US$100,000 with a

[10] From this point of view, this would be the international trade-equivalent to Global Entry, the U.S. international passengers' program.

[11] See Tweddle (2008).

[12] See Corcuera Santamaria and Garcia Navarrete (2014). Most of surveyed firms are based in Mexico, as this country has the largest number of AEO certified firms in Latin America and the Caribbean.

Figure 3.1 ■ World: Authorized Economic Operators Programs, 2016



Source: Prepared by the author based on WCO (2016) and Corcuera Santamaría (2016).
Note: Countries colored in yellow are those where the Authorized Economic Operator (AEO) program is currently active, whereas countries colored in dark gray are those where the AEO program is about to be launched. Countries shaded in light gray have no AEO program.

median value of US$10,000.[13] Thus, AEO firms incur a fixed cost to obtain a certificate that gives them access to a border processing "technology" that is associated with lower variable (and per-shipment) trade costs.

In recent years there has been literally an avalanche of security-motivated schemes for supply chains.[14] Currently, there are almost 70 active AEO programs worldwide (including 13 in Latin America and the Caribbean) and 16 additional ones are scheduled for launch (two in Latin America and the Caribbean) (Figure 3.1).[15] Table 3.1 presents basic information on the AEO programs for Latin America and the Caribbean, including those already operating and those still in the design stage.[16]

Most AEO programs date from the last five years. The median size of the teams managing AEO programs is six staffers, with the smallest (one) in Honduras, where the program is still in the design phase, and Guatemala (two), and the largest (45) in Mexico. These teams usually consist of a coordinator and a number of dedicated specialists.

[13] See Corcuera Santamaria and Garcia Navarrete (2014).
[14] See Grainger (2007) and EC (2012).
[15] See WCO (2016) and Corcuera Santamaría (2016). The former presents detailed information on all active AEO programs around the world, including starting date, relevant legislation, eligible operators, eligibility criteria and the accreditation process, advantages at the border, and number of certified firms.
[16] USAID (2010) provides a detailed guide on how to implement AEO programs.

Table 3.1 ■ Latin America and the Caribbean: Authorized Economic Operator Programs, 2016

Country	Status	Customs AEO Team	Current Eligible Operators	Certificate Validity	Participation of Other Border Agencies in the Certification Process
Argentina	Operating since August 2006	6 full-time specialists and 7 part-time specialists (total: 13)	Exporters, importers, and customs brokers	Indefinite subject to compliance audits	No
Bolivia	Operating since March 2015	1 coordinator and 4 full-time specialists (total: 5)	Exporters and customs brokers	Three years with at least two visits to firms' facilities during this period	No
Brazil	Operating since December 2014	1 full-time coordinator and 19 full-time specialists (total: 20)	All agents along the supply chain	Indefinite with periodic revalidations within three to five years depending on the monitoring results	National Sanitary Vigilance Agency (ANVISA) and International Agricultural Vigilance Agency (VIGIAGRO) (under negotiation)
Chile	Design stage	3 part-time specialists (total: 3)	Exporters, importers, and customs brokers	Indefinite	No
Colombia	Operating since November 2011	1 coordinator, 5 full-time specialists, 3 support officials, and 6 part-time specialists from other agencies (total: 15)	Exporters	Indefinite with revalidations at least every two years	Departments of Defense (Narcotics Police), Transportation (Ports and Airports), Health, Agriculture, and Trade
Costa Rica	Operating since March 2011	1 coordinator and 5 specialists (total: 6)	All agents along the supply chain	Four years with annual self-assessments	Ministry of Agriculture and Ministry of Health (under negotiation)

(continued)

Table 3.1 ■ Latin America and the Caribbean: Authorized Economic Operator Programs, 2016 (*continued*)

Country	Status	Customs AEO Team	Current Eligible Operators	Certificate Validity	Participation of Other Border Agencies in the Certification Process
Dominican Republic	Operating since March 2012	1 coordinator, 8 full-time specialists, 9 auditors at customs, and 3 specialists in other agencies (total: 21)	All agents along the supply chain	Three years and renewable with pre-announced and periodic revalidations	Ministry of Public Health, Ministry of Agriculture, Ministry of Environment, National Directorate for Drug Control, Port and Airport Security Corps, National Council of Free Trade Zones
Ecuador	Operating since August 2015	1 coordinator and 5 full-time specialists (total: 6)	Exporters and customs brokers	Three years and renewable with annual visits to firms' facilities	No
El Salvador	Pilot stage	1 coordinator, 4 full-time specialists, and 2 interns (total: 7)	Exporters	Three years with annual self-assessments and revalidations	No
Guatemala	Operating since November 2010	2 full-time specialists (total: 2)	All agents along the supply chain	Three years	No
Honduras	Design stage	1 full-time specialist (total: 1)	Exporters	Three years and renewable	No

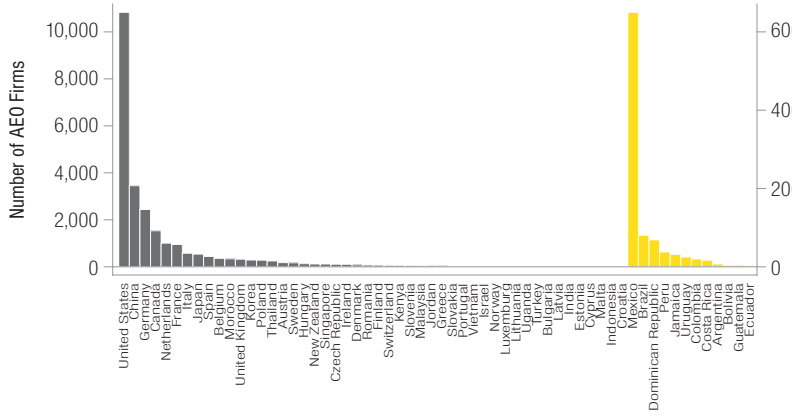
(continued)

Table 3.1 ■ Latin America and the Caribbean: Authorized Economic Operator Programs, 2016 (*continued*)

Country	Status	Customs AEO Team	Current Eligible Operators	Certificate Validity	Participation of Other Border Agencies in the Certification Process
Jamaica	Operating since August 2014	7 full-time specialists (total: 7)	All agents along the supply chain	Three years	Public Sector Inter-Institutional Committee, which has representatives of all border agencies
Mexico	Operating since January 2012	1 central manager, 1 manager, 4 deputy managers, 6 department chiefs, 15 specialists, and 18 analysts (total: 45)	Exporters, importers, customs brokers, and truck carriers	One year and renewable	No
Nicaragua	Pilot program	2 full-time specialists and 3 part-time specialists (total: 5)	Exporters	Indefinite with renewals every three years	No
Panama	Operating since May 2016	1 coordinator and 3 specialists (total: 4)	Exporters	Three years and renewable with annual revalidations	All border agencies are considered support and control entities
Peru	Operating since March 2013	1 coordinator, 9 specialists, and 1 administrative support officer (total: 11)	Exporters, customs brokers, and customs warehouses	Three years and renewable with annual revalidations	No
Uruguay	Operating since March 2014	5 full-time specialists (total: 5)	All agents along the supply chain	Three years and renewable with periodic visits to firms' facilities	No

Source: Corcuera-Santamaría (2016).

Figure 3.2 ■ World: Number of Firms Certified as Authorized Economic Operators, 2016



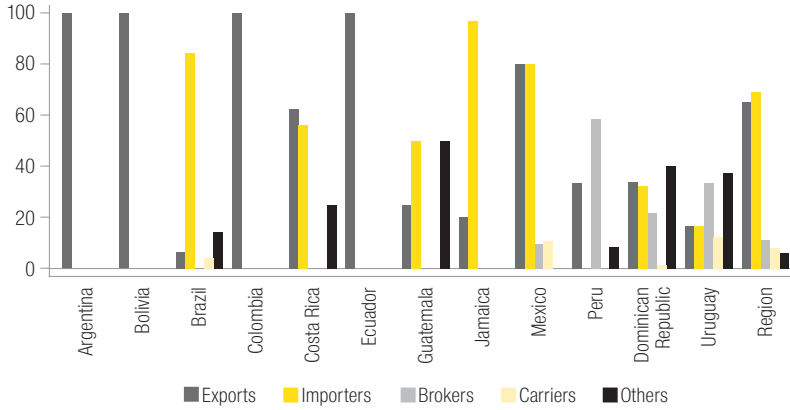
Source: Author's calculations based on data from U.S. Customs and Border Protection; European Union; and Corcuera Santamaría (2016).
Note: The figure shows the total number of firms certified as Authorized Economic Operators (AEOs) in Latin America and the Caribbean (yellow bars, measured on the right axis) and in the rest of the world (dark gray bars, measured on the left axis).

The spectrum of eligible operators extends from only exporters, especially in those programs being designed or in the early stages of implementation (e.g., El Salvador, Honduras, Nicaragua, and Panama), to all agents along the supply chain (e.g., Brazil, Costa Rica, Dominican Republic, Guatemala, Jamaica, and Uruguay). Operators' certificates are typically valid for three years with renewal or are valid indefinitely, in both cases subject to periodic reassessments, including inspection visits to firms' facilities.

The certification process is led and carried out by the countries' customs agencies. Only in a few cases do other border agencies participate in this process (e.g., Colombia, Jamaica, and Dominican Republic).

The number of certified firms varies widely across countries, but these firms generally account for a substantial share of their countries' trade (Figure 3.2). Thus, in the United States there are more than 10,000 (4,200) C-TPAT certified (trading) firms that jointly represent roughly 54 percent of the country's total import value. In the European Union, the involvement of more than 7,500 certified firms in the supply chain exceeds 50 percent of the total as measured in terms of their percentage share in

Figure 3.3 ■ Latin America and the Caribbean: Firms Certified as Authorized Economic Operators by Type of Operator, 2016



Source: Author's calculations based on data from Corcuera Santamaría (2016).
Note: The figure shows the distribution of firms certified as Authorized Economic Operators in each Latin American and Caribbean country with an active AEO program across main operator categories (i.e., exporters, importers, customs brokers, carriers, etc.).

the total number of customs declarations[17] Japan has roughly 250 AEO exporters and 100 AEO importers and China has certified 1,600 companies. In Mexico, more than 600 firms currently have AEO certification.

Figure 3.3 shows the breakdown of the total number of AEO certified firms by type of operator for Latin American and Caribbean countries. Exporters and importers represent more than two-thirds of the approximately 900 AEO firms in the region and are therefore by far the largest group. Customs brokers are relatively important among accredited companies in Peru and Dominican Republic, while carriers are primarily accounted for by Mexico.

3.3 Case Study: Mexico's Authorized Economic Operator Program

3.3.1 New Scheme of Certified Firms (Nuevo Esquema de Empresas Certificadas – NEEC)

In 2002, Mexico's Tax Administration Service (*Servicio de Administración Tributaria* – SAT) launched the Certified Company Program (*Compañía*

[17] See AEO Network Group (2013) and EC Taxation and Customs Union (2016). C-TPAT is available for importers, carriers, customs brokers, port operators, freight consolidators, third-party logistic providers, and foreign firms (Mexican and Canadian) manufacturers (Irish 2009). When all these categories are considered, the total number of certified companies reaches 10,832.

Certificada - CC) to provide trade facilitation benefits to trustworthy firms with certain characteristics that meet specific criteria in terms of their import activities. Currently, eligible firms for the CC Program include firms that imported a value of more than 300 million Mexican pesos (roughly US$20 million) the previous semester; IMMEX (*maquiladora*) firms that imported a value of more than 200 million Mexican pesos (approximately US$13 million) the previous semester; IMMEX (*maquiladora*) firms that do not meet the former criterion but are approved by customs; and courier (messaging and packaging) firms.[18] The CC Program does not include security requirements among eligibility conditions and provides participating firms with a limited set of trade facilitation advantages, including less frequent physical inspections and prioritized customs clearance.

In response to the adoption of the WCO SAFE Framework in 2005 and the approval of its complement with provisions on AEO programs in 2007, the SAT began in 2009 to design the NEEC, its own AEO program to incorporate the security dimension. It published general rules for the NEEC in 2011 and formally launched it in early 2012. The NEEC aims to strengthen the security of the trade logistic chain by implementing minimum standards for safety that are internationally recognized in cooperation with the private sector and thereby favor the competitiveness of Mexican firms and their foreign trade.[19]

In order to be eligible for NEEC certification, firms must be trustworthy. They have to meet tax, customs, and, distinctively, security requirements. Regarding tax and customs requirements, firms must prove a record of trade activities (and hence of interactions with customs) for

[18] The IMMEX (*maquiladora* regime) is a program that allows for temporarily importing foreign goods that will be used in an industrial or service process intended to produce, transform, and repair such goods for their subsequent export or for provision of export services, without being subject to payment of the general tax for imports, the value-added tax, and, where applicable, countervailing duties. In order to obtain CC certification, IMMEX firms that imported less than 200 million Mexican pesos the previous semester have to submit a copy of their annual electronic report of total sales and exports for the preceding years; a copy of a document showing that the firm has more than 100 employees registered with the Mexican Institute for Social Security (*Instituto Mexicano de Seguridad Social* – IMSS); and a copy of a document proving that the firm has fixed assets in the form of machinery and equipment that are worth more than US$250,000. If the value of these assets exceeds US$10 million, firms do not need to submit proof of the number of employees (SAT 2015).

[19] See Clavijo Mostajo (2013).

Table 3.2 ■ Mexico: Security Standards for Firm Certification under the New Scheme of Certified Firms

Security Standard	Requirement in Practice
Supply Chain Security Planning	The firm must develop policies and documented procedures to carry out analyses aimed at identifying risks and weaknesses in its supply chain and then design and implement initiatives to mitigate them.
Facility Security	The firm must have mechanisms to prevent, detect, or dissuade the entry of unauthorized personnel to facilities. All sensitive areas must have physical barriers and devices to control or dissuade against unauthorized access.
Physical Access Controls	The firm must have mechanisms or procedures to keep control and a record of incoming employees and visitors, and to protect its goods. Access controls must include the identification of all employees, visitors, and suppliers in all entry points.
Trading Partners	The firm must have written and verifiable procedures for selecting and contracting commercial partners (i.e., carriers, manufacturers, vendors, parts and raw materials suppliers, services suppliers, etc.) and ask these partners to observe its security measures as defined by its risk analysis.
Process Security	The firm must establish control measures to ensure the integrity and security of the merchandise during transport, handling, customs clearance, and storage along the supply chain.
Customs Management	The firm must have documented procedures that establish internal and operational policies, as well as the necessary controls to fulfill customs obligations. In addition, the firm must have specialized staff and documented procedures to verify the information and documentation produced by the customs broker or the processes carried out by the in-house customs agent.
Security of Vehicles and Containers	The firm must maintain security in transport vehicles, containers, rail, trailers and semi-trailers to avoid access of unauthorized individuals or introduction of unauthorized materials. The firm must accordingly apply a high-security seal to all foreign-trade-related containers and trailers that meet or exceed ISO 17712 for high-security seals.
Staff Security	The firm must have documented procedures to record and assess individuals applying for positions and establish methods to periodically check current employees. Moreover, the firm must have training programs that disseminate its security policies as well as the consequences of and actions to take in the event of failure.

(continued)

Table 3.2 ■ Mexico: Security Standards for Firm Certification under the New Scheme of Certified Firms (*continued*)

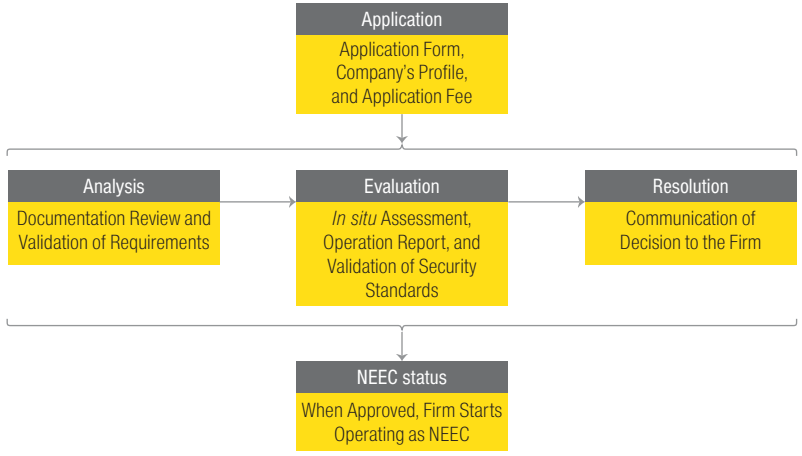
Security Standard	Requirement in Practice
Security of Information and Documentation	The firm must adopt preventive measures to keep the confidentiality and integrity of the information and documentation generated by its systems, including those used for the exchange of information with other supply chain members. Furthermore, the firm must have policies that include measures against misuse.
Security Training and Awareness	The firm must have a program established and maintained by security staff to recognize and raise awareness about terrorist and smuggler threats at each point of the supply chain. Employees must be aware of the procedures established by the firm to consider an issue and how to report it. The firm must provide additional training to employees in shipment and arrival areas and also to those who receive and open the mail.
Incident Management and Investigation	The firm must have documented procedures to report and investigate incidents within the supply chain as well as to take actions to prevent them.

Source: Prepared by the author based on information from Mexico's Tax Administration Service (Servicio de Administración Tributaria – SAT).

the past three years, have a good tax compliance track record, and have a digital invoicing system. Security requirements depend on the type of operator (e.g., importer, exporter, etc.), but generally refer to safety of trucks and containers, safety of personnel, process security and security planning in the supply chain, physical security including access control, commercial partners, information and document security, security training and awareness, and incident management and investigation (Table 3.2).

As for the certification process, firms must submit a complete application form and a company profile and pay a fee of approximately US$1,650. The customs agency assesses the application and the profile, and reviews its tax and customs compliance. Then the agency carries out visits to the firm's premises to observe and validate the information provided in the application and inspect the systems and security measures in place. Finally, the customs agency makes a decision on whether to grant the NEEC certification. The certification process may take from six months to one year (Figure 3.4).

Figure 3.4 ■ NEEC Certification Process – Six to 12 Months (at least 140 working days)



Source: Adapted by the author from Clavijo Mostajo (2013).
Note: NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms).

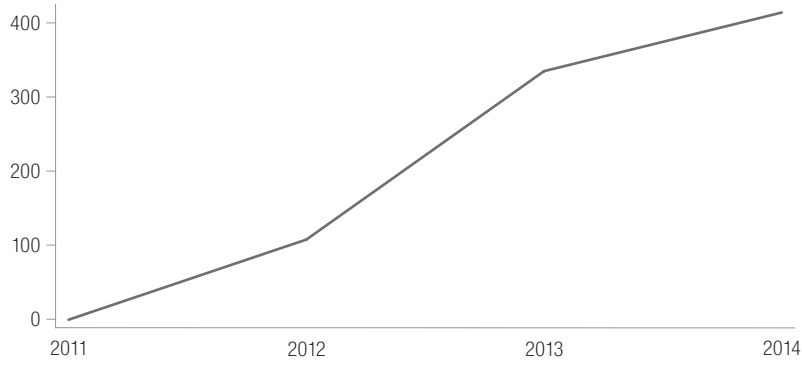
Certification is valid for one year (and renewable) and is associated with a number of advantages that primarily consist of reduced physical inspections and expedited customs clearance, in both cases to a significantly greater extent than similar advantages granted to CC firms. These advantages also include access to express/fast track lanes wherever available; administrative simplifications; and personalized attention through a designated account official.[20]

3.3.2 Data

The SAT kindly provided two databases for this analysis. The first database includes transaction-level export and import data from 2009 to 2014. Specifically, each record includes a firm's identification number, the product code (10-digit HS), the customs post (port/airport/land border) through which the shipment exits/enters Mexico, the destination/origin country, the export and import values in U.S. dollars, the quantities (weight) in kilograms, the channel through which the transaction was

[20] See SAT (2015).

Figure 3.5 ■ Mexico: Number of NEEC-certified Firms, 2011–2014



Source: Author's calculations based on data from Mexico's Tax Administration Service (*Servicio de Administración Tributaria* – SAT).
Note: NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms).

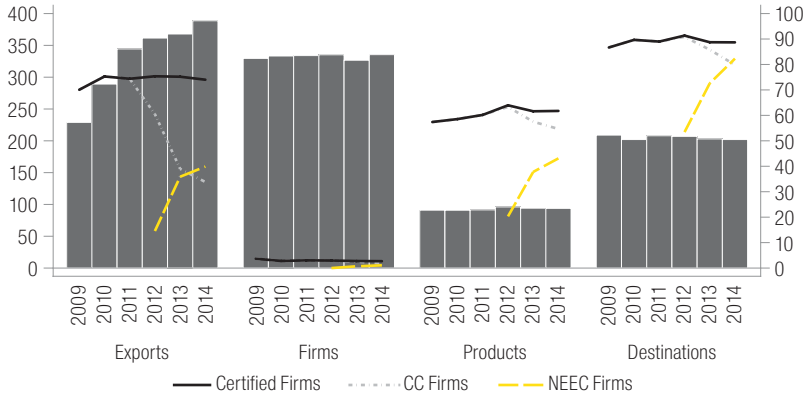
processed (either green or red), the date when customs processing of the shipment was requested (channel request), and the date when the shipment was authorized to leave customs (release date). The second database informs whether each specific shipment was made by a firm that at the time in question was certified with the SAT. The data specifically allow for distinguishing two groups of certified firms: NEEC and other SAT certification programs, with the latter primarily referring to the CC Program. The database also informs whether the firms operate under the *maquiladora* regime (IMMEX) or are also C-TPAT-certified.

3.3.3 The NEEC in Mexico's Trade and the Average NEEC Exporter

As mentioned above, the NEEC was implemented in early 2012. The first certification was granted in March 2012. The total number of certified firms grew from 88 in 2012 to approximately 400 in 2014 (Figure 3.5).

Figures 3.6 and 3.7 show the relative importance of all certified firms and NEEC-certified firms in Mexican exports and relevant exporter characteristics, respectively. In particular, Figure 3.6 reports the country's total exports and key aggregate extensive margin indicators along with the share accounted for by certified (CC and NEEC) firms from 2009 to 2014. Around 33,000 exporters sold about 9,500 products in more than 200 destinations for almost US$400 billion in 2014. Approximately 3.5 percent of the

Figure 3.6 ■ Mexico: The NEEC in Aggregate Exports, 2009–2014

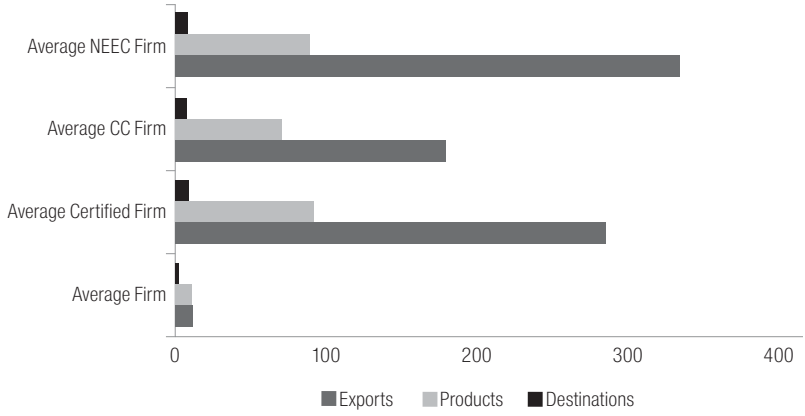


Source: Author's calculations based on data from Mexico's Tax Administration Service (Servicio de Administración Tributaria – SAT).
Note: The figure reports trends in aggregate export indicators (gray bars, left y axis) over 2011–2014 along with the percentage share of (CC and NEEC) certified firms, CC firms, and NEEC firms (black lines, dashed light gray lines, and yellow lines, respectively, right axis). Exports are expressed in billions of U.S. dollars, the number of firms is expressed in hundreds, and the number of products is expressed in hundreds. NEEC: Nuevo Esquema de Empresas Certificadas (New Scheme of Certified Firms).

exporters were certified. These firms jointly accounted for three-quarters of Mexican aggregate exports. The products in which they registered foreign sales correspond to 63 percent of those of the country as a whole. In the case of destinations, certified firms sold to more than 90 percent of the destinations to which Mexico exported. Foreign sales by NEEC-certified firms, which accounted for 1.4 percent of the total number of exporters, amounted to 40 percent of Mexico's total exports, 43 percent of the total number of products, and 81 percent of the total number of destinations in 2014. It is worth noting that most firms that became NEEC-certified did so after being certified under the CC Program. This can be seen by comparing the evolution of the shares of CC and NEEC firms in both total Mexican exports and the number of exporting firms.

Figure 3.7 characterizes both the overall average Mexican exporter and the average CC and NEEC exporters in terms of their total foreign sales, number of exported products, and number of reached destinations in 2014. On average, exporting firms sold 11 products to 2.5 countries for approximately US$11 million. The average certified exporter is larger along these dimensions. This firm exported 91 products to nine destinations for US$285 million. In particular, the average NEEC-certified firm registered total exports of US$334 million and was active in 89 products and

Figure 3.7 ■ Mexico: Average Exporters and Average NEEC-certified Exporter, 2014



Source: Author's calculations based on data from Mexico's Tax Administration Service (*Servicio de Administración Tributaria* – SAT).
Note: The figure reports average export outcomes (total exports, number of products, and number of destinations) for all CC- and NEEC-certified firms, CC-certified firms, and NEEC-certified firms in 2014. Exports are expressed in millions of U.S. dollars. NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms); CC: *Compañía Certificada* (Certified Company Program).

8.6 destinations, whereas its CC counterpart did so for US$180 million with 70 products and 7.5 destinations.

3.4 The Impact of Authorized Economic Operator Programs on Firms' Exports and Imports: Evidence from Mexico

3.4.1 Baseline: What Are the Trade Effects of the Authorized Economic Operator Program?

As explained in Section 3.3, the main difference between NEEC- and CC-certified firms is that the former are security-certified and, as such, have access to greater trade facilitation advantages. Further, as suggested by the evidence presented in that section, NEEC-certified firms are substantially different from the average regular exporter but relatively similar to and thus most comparable with CC-certified firms. Hence, the trade impact of the NEEC is estimated by primarily comparing exports from NEEC- and CC-certified firms, which allows the impact associated with the security-related component to be better isolated and a more homogenous sample to be used.

In particular, the change in exports from firms that become NEEC-certified is contrasted with the change in exports from CC-certified firms. Specifically, NEEC status varies across firm-product-destinations within a given year and within firm-product-destinations over time.[21] The former variation comes from the fact that firms obtain the NEEC certification at different dates within a year (upper panel of Figure 3.8). Depending on when during the year the firms export a given product to a given destination, the NEEC certification status under which exports are made can vary across product-destination combinations for given firms within given years. The lower panel of Figure 3.8 shows the distributions of the share of firm-product-destination combinations (with at least one export under NEEC) for firms that were certified by the NEEC in each year during 2012–2014.[22] As a consequence, it is possible to estimate the NEEC export effects exploiting the variation in this firm-product-destination specific status over time and account for time-varying firm-level factors (e.g., size, productivity, assistance from PROMEXICO, the country's trade promotion agency, to sell abroad) as well as for time-varying product-destination factors (e.g., transport costs, tariffs, exchange rates, etc.) that might influence export outcomes and thus contaminate the estimates of the NEEC effects.[23]

Figure 3.9 presents the estimated effect of NEEC certification on firms' exports for different samples. In the baseline, which corresponds to the export intensive margin or continuing export flows (i.e., flows that are present in at least two consecutive years) and includes all NEEC- and CC-certified firms, NEEC certification has been associated with 73.1 percent higher export growth (yellow bar).[24] The sample average

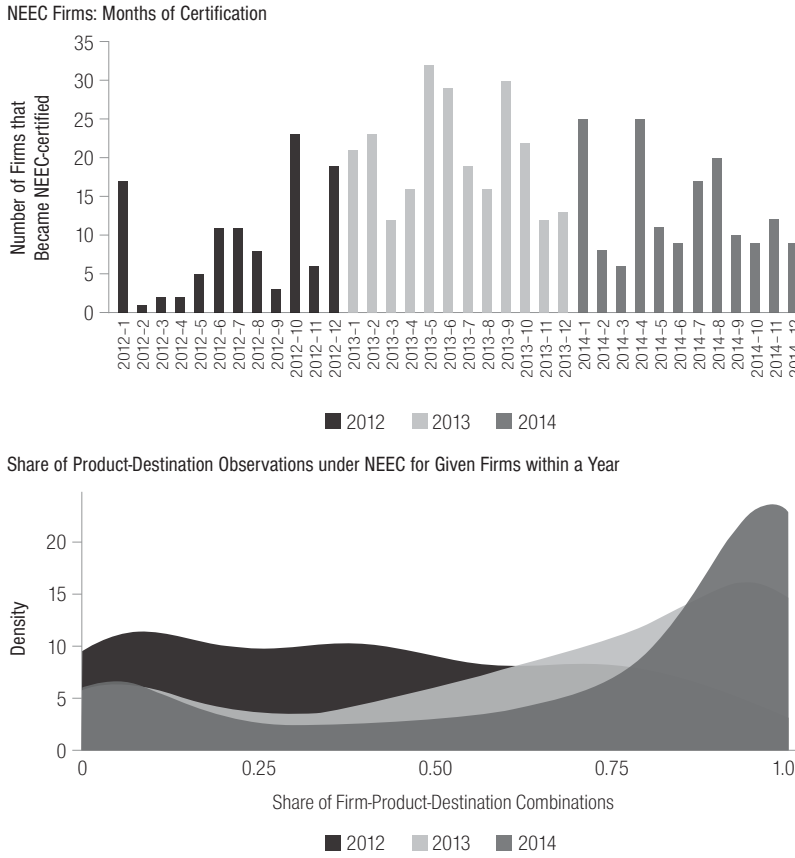
[21] Defining the treatment at the firm-year level would imply classifying as NEEC a relative large number of firm-product-destination-year observations that are actually non-NEEC. The percentage share of these observations would on average be 26 percent over the sample period and almost 50 percent in 2012.

[22] The figure presents kernel density estimates.

[23] The baseline equation has as the dependent variable the change in (the natural logarithm of) the export value at the firm-product-destination-year level. The main explanatory variable is the change in a binary indicator that takes the value of one if the firm ships the product to the destination in the year in question as NEEC-certified and zero otherwise, along with firm-year and product-destination-year fixed effects. Note that the firm-year fixed effects control for potential firms' self-selection, as all NEEC eligibility criteria can be mapped into firm-level characteristics. Standard errors are clustered by firm.

[24] As explained in Section 3.3, the NEEC aims to facilitate trade for trustworthy firms. How well the program is doing in identifying this kind of firms can be assessed by exploiting

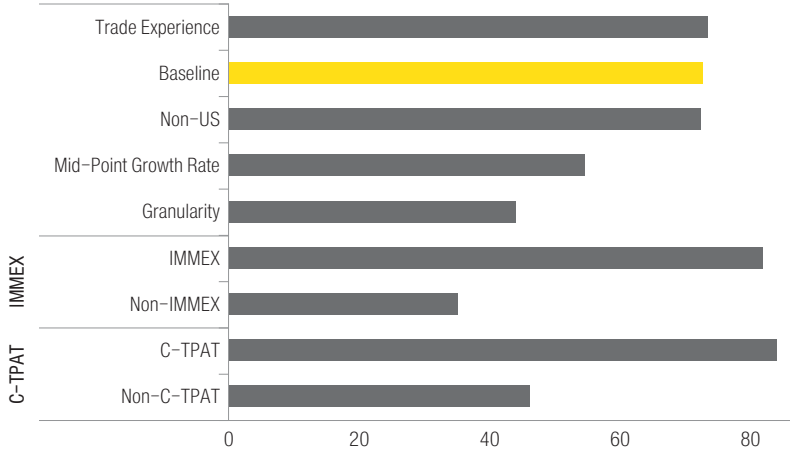
Figure 3.8 ■ Mexico: Months of Certification of NEEC-certified Firms and Share of Product-Destination Observations under the NEEC for Given Firms within a Year, 2012–2014



Source: Author's calculations based on data from Mexico's Tax Administration Service (*Servicio de Administración Tributaria* – SAT).
Note: The upper panel reports the number of firms that became NEEC-certified each month during 2012–2014, whereas the lower panel shows the distribution of the share of firms' product-destination exports as NEEC in their respective total number of product-destination exports within each year of the aforementioned period. NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms).

information on the existence and severity of irregularities at the transactional level kindly provided by the SAT. Formally, it is possible to estimate an equation over 2009–2011 where the dependent variable is a binary indicator that takes the value of one if at least one irregularity (a serious irregularity) was detected in a given firm-product-destination-year quadruple and zero otherwise, and the explanatory variables are a binary indicator that takes the value of one if the firm in question was later certified under the NEEC and zero otherwise, and product-destination fixed effects. Estimates of this equation suggest that NEEC-certified firms do indeed have a better past customs compliance record.

Figure 3.9 ■ Mexico: Impact of NEEC Certification on Firms' Exports, 2011–2014



Source: Author's calculations based on data from Mexico's Tax Administration Service (*Servicio de Administración Tributaria* – SAT). Estimates presented in this figure are reported in Tables 3, 4, and 5 in Carballo, Schaur, and Volpe Martincus (2016a).
Note: The figure shows the estimated percentage impact of NEEC certification on firms' export growth rates for alternative samples. Baseline: All NEEC and CC firms are included; Trade Experience: Only NEEC and CC firms that registered trade in the three previous years are considered; Non-U.S.: Only exports to countries other than the United States are considered; Mid-Point Growth Rate: Exports that are zero in one of two consecutive years are considered; Granularity: Changes in exports are weighted by their initial relative size (i.e., in 2011). In the bottom part of the figure, estimates allow for the NEEC export impact to differ between NEEC-certified firms that are also under the IMMEX (*maquiladora*) regime and NEEC-certified firms that are not IMMEX, and between NEEC-certified firms that are also certified under the U.S. Customs-Trade Partnership Against Terrorism (C-TPAT) initiative and NEEC-certified firms that are not. NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms); CC: *Compañía Certificada* (Certified Company Program).

(logarithm) annual growth rate of firm-product-destination exports in 2014 was 3.8 percent, so this would imply that exports by security-certified firms would have a growth rate 2.8 percentage points higher than those from counterparts lacking such certification.[25]

Admittedly, such estimates could be potentially affected by various problems. This is why several robustness checks are discussed next. The estimated average effect could be largely driven by a majority of small export flows with significantly higher export growth rate responses than their more decisive large counterparts and thus not be representative for the export growth response of the economy as a whole. When the relative importance of export flows is factored in and the influence of smaller flows is accordingly reduced, the estimated impact, albeit smaller than

[25] All estimation results reported hereafter are similar to those obtained when considering all firms instead of restricting the sample to NEEC- and CC-certified firms.

the baseline, remains economically important (bar labeled "Granularity" in Figure 3.9).[26] Following the same reasoning as before, the growth rate of exports from NEEC-certified firms would have been 1.8 percentage points higher than those from comparable non-NEEC-certified firms.[27] A back-of-the-envelope calculation based on this estimate suggests that total Mexican exports would have been on average about 6 percent smaller than they actually were over 2012–2014 in the absence of the NEEC.

As mentioned above, the baseline estimate is exclusively based on continuing firm-product-destination export flows. It is well known that export flows that are equal to zero at certain points in time are pervasive in international trade, especially at this level of aggregation. When these flows are taken into account, estimates convey exactly the same message as the baseline counterparts (bar labeled "Mid-Point Growth Rate" in Figure 3.9). Further along these lines, NEEC has had a significant positive effect on the destination extensive margin.[28] In other words, the NEEC appears to have helped firms reach new export markets.

As noted in Section 3.3, firms are eligible to become NEEC-certified as long as they have traded and thus have interacted with customs during the previous three years. The estimate labeled "Trade Experience" has been obtained by restricting the sample to firms that meet this criterion. The estimating sample does not experience a noticeable change because CC-certified (as well as NEEC-certified) firms are large and have registered trade operations consistently over time. Unsurprisingly, estimation results are fully in line with the baseline.[29]

Firms can have access to similar or complementary trade facilitation benefits in the framework of other programs either at home or abroad. Thus, in Mexico firms can operate under the *maquiladora* regime (IMMEX) and thereby import inputs under very favorable conditions (see Section

[26] The baseline equation is re-estimated by weighted least squares using the value of the export flows in the first pre-NEEC sample year (i.e., 2011) as weights.

[27] Interestingly, there is some evidence that the NEEC has also fostered employment. The growth rate of the number of direct employees was 8.3 percent higher for NEEC-certified firms than for their non-NEEC peers.

[28] This is assessed by estimating a variant of the baseline equation on data at the firm-product-year level, where the dependent variable is the change in (the natural logarithm of) the number of destinations and the main explanatory variable is the change in the NEEC status indicator, along with firm-year and product-year fixed effects.

[29] Only six firms did not renew their NEEC certification. Results do not change when the respective observations are removed from the estimating sample.

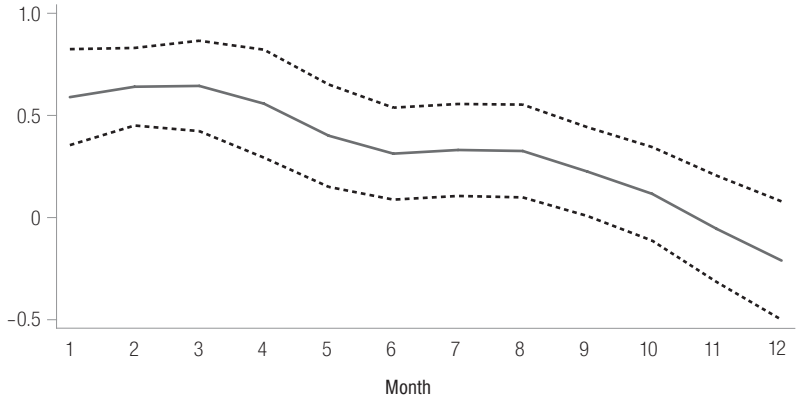
3.3). Some NEEC-certified firms can also be IMMEX and, specifically, IMMEX firms may be overrepresented among NEEC-certified firms relative to CC-certified firms. In fact, more than half of NEEC-certified firms are IMMEX. Similarly, Mexican exporting firms can get certified as C-TPAT by U.S. Customs (see Section 3.2). Again, more than half of NEEC-certified firms are also C-TPAT-certified. Further in this sense, the United States is by far the most important destination for Mexican exports. Over the sample period, the United States accounted for roughly 80 percent of total Mexican foreign sales. This also holds for NEEC-certified firms: on average, more than 83 percent of their exports had the United States as a destination. Thus, it might well be the case that IMMEX firms or C-TPAT certification instead of NEEC certification is behind the observed superior export outcomes. This is why it is important to distinguish the effects of NEEC on exports depending on whether NEEC-certified firms are also IMMEX firms or C-TPAT-certified, or when simply excluding exports to the United States.[30] Estimated effects are presented in the lower part of Figure 3.9. These estimates reveal that effects are larger for NEEC-certified firms that are also under IMMEX and C-TPAT, which might be indicative of the additional benefits associated with combining programs and, more precisely, from Mutual Recognition Agreements (MRAs), as these allow for expediting clearance and thus narrowing both sides of the borders.[31] Most importantly, whereas it is relatively smaller, the impact of NEEC certification on remaining firms' exports is still positive and significant. Moreover, the effect of this certification on sales to destinations other than the United States is virtually indistinguishable from the baseline. Hence, NEEC certification appears to have a strong independent effect on exports.

As discussed above, firms can obtain NEEC certification at different points in time. The earlier in the year firms become NEEC-certified, the larger will be the share of their respective firm-product-destination flows that will be processed under the advantageous conditions associated with such status. Accordingly, the impact of NEEC certification can be expected to incrementally accumulate over months within a year. In

[30] On average, the United States accounted for 83 percent and 85 percent of IMMEX and C-TPAT firms' exports over 2012–2014, respectively.

[31] As will be discussed below, Mexico and the United States signed an MRA in October 2014 that entered into force in 2015. Under that agreement, NEEC-certified firms are treated as C-TPAT-certified in the United States and the latter are treated as the former in Mexico.

Figure 3.10 ■ Mexico: Impact of NEEC Certification on Firms' Exports, Timing, 2011–2014



Source: Author's calculations based on data from Mexico's Tax Administration Service (*Servicio de Administración Tributaria* - SAT).
Note: The figure shows the estimated percentage impact of NEEC certification on firms' export growth rates when allowing for different effects across firm-product-destination combinations depending on the month in which they were first exported as NEEC-certified, along with the respective 95 percent confidence intervals. NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms).

particular, assuming all else is equal, the NEEC impact should be larger for firm-product-destination flows that become NEEC-certified early in the year than for those that become certified late in the year. Figure 3.10 reports results from an estimation that allows for different effects across firm-product-destination combinations depending on the month in which they were first exported as NEEC-certified.[32] Estimated export effects decrease as the number of months under certification declines and, specifically, vanish when certification kicks in over the last quarter of the year.[33]

[32] The dependent variable of the estimating equation is the change in (the natural logarithm of) the export value at the firm-product-destination-year level. The main explanatory variable is the change in a binary indicator that takes the value of one if the firm ships the product to the destination in the year in question as NEEC-certified and zero otherwise, interacted by a set of 12 binary indicators, each of which takes the value of one in one month of the year and zero otherwise. Firm-year and product-destination-year fixed effects are included. Standard errors are clustered by firm.

[33] Results are qualitatively the same if the specification additionally includes month fixed effects. Consistently, the estimated effect is similar to the baseline when the NEEC group is restricted to those firm-product-destination-year observations with more than 50 percent of the respective shipments as NEEC-certified (and the remaining NEEC observations are dropped from the estimating sample).

Finally, it might be argued that NEEC-certified firms have expanded their exports at least partially at the expense of exports by peers that are not NEEC-certified, or might have become intermediaries for the latter, thus extending them the trade facilitation advantages they enjoy. In such cases, estimates reported so far would partially or entirely reflect a redistribution of exports across firms with smaller or no changes in total exports. Results from estimations that account for these possible "market stealing" and "market restructuring" phenomena suggest that, if any, these effects have been very limited in scale and, accordingly, that certification seems to have had a net positive impact on Mexico's aggregate exports.[34]

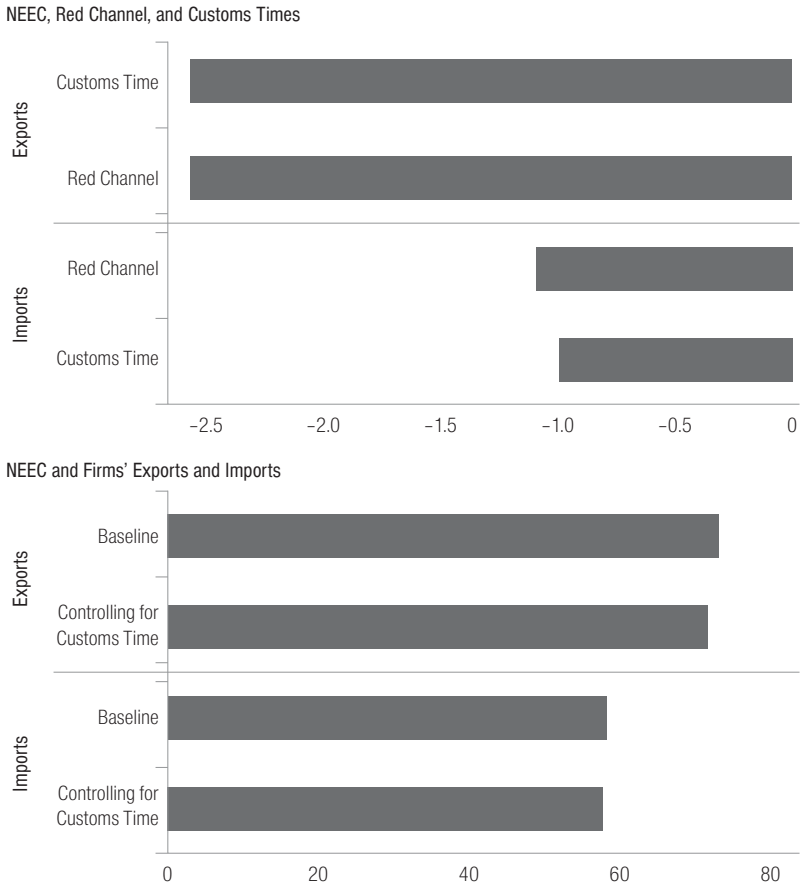
3.4.2 The Mechanisms: What Is Behind the Trade Effects of the Authorized Economic Operator Program?

The evidence presented so far consistently shows that the NEEC appears to have fostered increased exports by Mexican firms. This improved export performance could be due to the trade facilitation advantages that the program officially provides to participating firms (see Section 3.3). More specifically, shipments from NEEC-certified firms enjoy a lower rate of physical inspection and shorter times in customs, which in turn can positively affect firms' foreign sales.

[34] The first estimation ("market stealing") assumes that, if present, the negative cross-firm externalities are specific to foreign sales of given product-destination combinations, so that the baseline equation is estimated on alternative subsamples that involve comparisons between exports from NEEC-certified firms ("treated") and their non-NEEC counterparts in the same products to the same destinations ("untreated") and between the former ("treated") exports and those other firms without changes in their certification status exporting in other product-destination combinations ("residual"). Estimates of these equations point to no significant differences between "untreated" and "residual" relative to "treated" export flows. The second estimation ("market restructuring") is based on the presumption that, if foreign sales from non-NEEC-certified firms become increasingly channeled through NEEC-certified firms, the NEEC would have a stronger impact on exports from firms belonging to sectors that are naturally more intermediation-intensive. This is evaluated by estimating an equation that allows for different effects on exports across groups of products (i.e., HS 2-digit, HS 4-digit, and HS 6-digit levels) depending on whether their share of intermediaries (wholesalers and retailers) is above or up to the median across these groups of products as reported in Ahn, Kandelwhal, and Wei (2011). Estimates of this equation do not differ across these two groups.

Figure 3.11 shows that, in accordance with the NEEC's stated provisions, the export shipments of NEEC-certified firms are actually significantly less likely to be subject to intrusive examination, and their customs delays are substantially shorter. Moreover, these shorter delays can be at least partially traced back to the less frequent

Figure 3.11 ■ Mexico: Impact of NEEC Certification on Assignment to the Red Channel, Customs Times, and Firms' Exports and Imports, 2011–2014



Source: Author's calculations based on data from Mexico's Tax Administration Service (*Servicio de Administración Tributaria* – SAT). Estimates presented in this figure are reported in Table 8 in Carballo, Schaur, and Volpe Martincus (2016a).
Note: The upper panel reports the estimated percentage impact of NEEC certification on assignment to physical inspection (Red Channel) and customs processing times (Customs Times), whereas the lower panel shows the estimated percentage impact of NEEC certification on firms' export and import growth rates, the latter both without and controlling for customs processing times. NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms).

assignments to the red channel and are associated with larger firms' exports.[35]

As discussed in Section 3.1, NEEC certification could also serve as a quality signaling mechanism, thereby reducing information barriers with potential buyers and, as such, have an effect on firms' exports beyond the effect related to customs treatment. The fact that NEEC certification has a positive export impact even after controlling for customs processing times tends to indicatively support this conjecture (bar "Controlling for Customs Time" in Figure 3.11).[36]

The NEEC also provides participating firms with more favorable customs treatment when importing, i.e., their import shipments are less frequently assigned to physical inspections and spend less time in customs. Remaining estimates shown in Figure 3.11 confirm that NEEC-certified firms have indeed experienced higher import growth and that this has been associated with less intrusive controls and shorter customs delays.[37]

3.4.3 Has the NEEC Been Cost-Effective?

Lower frequency of physical inspections and shorter customs processing times release customs resources. Taking into account the total annual number of export and import shipments subject to those inspections in recent years—and that, on average, two inspectors with average annual salaries of US$11,811 are needed for each inspection—the reduction in the

[35] In contrast, express lanes in certain customs offices, another of the trade facilitation advantages to which NEEC firms have access, do not seem to make a significant difference. More precisely, the effects of NEEC on firms' foreign sales are similar in customs offices with and without express lanes. Estimations have been carried out on data at the firm-product-destination-year level using the main customs office at that level to discriminate across these flows or on data at the firm-product-destination-customs branch-year level and allowing for different effects across groups of customs posts with and without express lanes.

[36] The baseline estimating equation is augmented to include (the natural logarithm of) the median customs processing times as an additional explanatory variable.

[37] This is assessed by estimating the baseline equation using import data. Furthermore, estimates of a variant of this equation that allow for different effects across groups of products depending on how heavily their production relies on imported inputs as determined based on the national input-output matrix highlight that the impact of NEEC-certification is similarly positive and significant on both exports of products in which imported inputs are used intensively and those of their counterparts that do not depend that much on these inputs.

inspection rate and the length of time in customs associated with NEEC certification amounts to gross savings of approximately US$520,000 for the Mexican customs administration. On the other hand, the NEEC certification process entails its own costs. The assessment of each application typically takes almost two net working weeks (spread over several months, as this involves both documentary review and visits to the firm's facilities) and is carried out by five officials whose average annual salary is US$18,280.[38] Assuming that the number of certified firms corresponds to the average over 2012–2014, the total cost of these certifications as measured by the overall compensation of the intervening agents is roughly US$422,000. Hence, without counting the effect of the program on firms' exports, switching the focus from inspection of individual shipments to firms has generated annual average net savings of almost US$100,000 for the public sector.

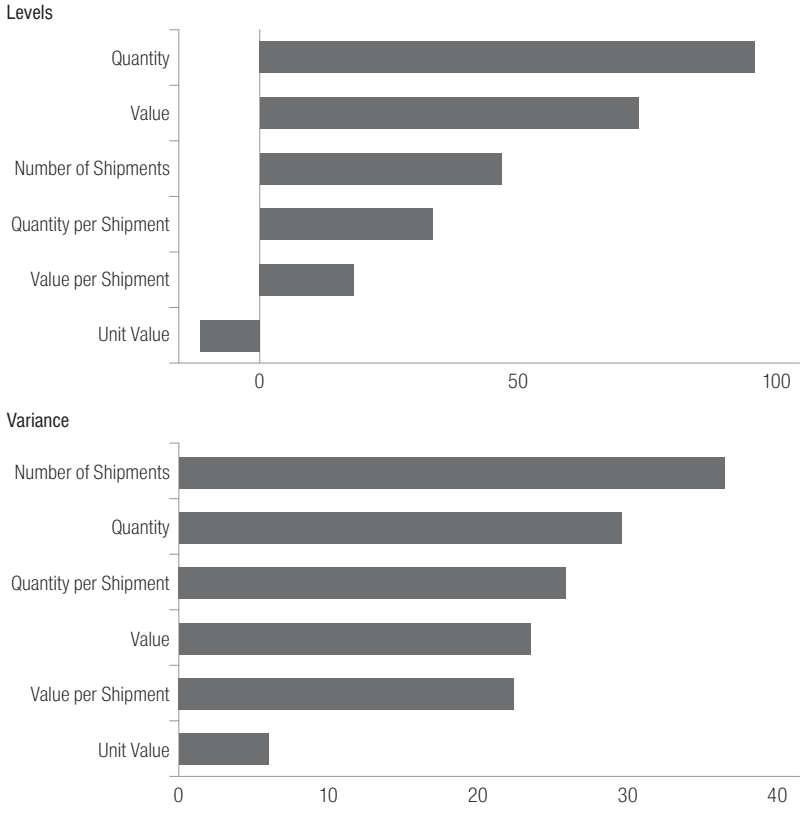
3.4.4 The Channels: How Does the Authorized Economic Operator Program Affect Trade?

The channels of the NEEC export effects can be disentangled by estimating the effects of the respective certification on the quantity (weight) shipped, unit values, number of shipments, and average value and quantity per shipment. Estimated effects presented in the upper panel of Figure 3.12 reveal that the certification scheme has mainly affected the number of shipments and thereby the quantity shipped. Thus, the NEEC has led to an increase in the growth rate of the number of shipments by 46.7 percent. Interestingly, participation in the program seems to have been associated with a reduction in unit values. Given the results presented above, this can be traced back to shorter customs delays and thereby reduced trade costs. Estimated effects in the lower panel of Figure 3.12 indicate that the NEEC has been associated with larger export variability.[39] This may reflect an increased pass-through of foreign demand volatility, possibly due to participation in production chains through outsourced activities. More specifically, the NEEC has made it possible for firms to

[38] A working week of 40 hours (i.e., 8 hours x 5 days) is assumed.

[39] The lower panel of Figure 3.12 shows estimates of a variant of the baseline equation where the dependent variable is the standard deviation of the outcome variables listed above across months within a year.

Figure 3.12 ■ Mexico: Impact of NEEC Certification on Firms' Exports, Channels, 2011–2014



Source: Author's calculations based on data from Mexico's Tax Administration Service (*Servicio de Administración Tributaria* – SAT). Estimates presented in this figure are reported in Table 9 in Carballo, Schaur, and Volpe Martincus (2016a).
Note: The figure shows the estimated percentage impact of the NEEC on the growth rate of firms' export values, quantity (weight), number of shipments, export value per shipment, export quantity per shipment, and unit value (upper panel) and the standard deviation of these variables across months within a year (lower panel). NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms).

better respond to time-specific demands from foreign buyers by shipping more just-in-time and therefore to export more, but this has raised shipment volatility in terms of frequency and size.[40] In short, the NEEC has allowed for expanding firms' exports and at the same time has resulted in increased shipping variability.

[40] This complements evidence reported by Bergin, Feenstra, and Hanson (2009) that Mexican (*maquiladora*) industries that are linked to U.S. offshoring experience changes in employment that are twice as volatile as those of their U.S. peers.

3.4.5 The Distributional Angle: Are the Trade Effects of the Authorized Economic Operator Program Heterogeneous across Products and Destinations?

Figure 3.13 presents evidence that the effects of the NEEC are heterogeneous across destinations.[41] According to the estimates, the positive response of exports to NEEC certification is stronger in more distant and thus less familiar destinations, and in importing countries where there is an AEO program in place and thus buyers are more likely to be aware of the program and what certification stands for (upper panel of Figure 3.13).[42] This provides further informal support to the NEEC as having an independent positive impact on firms' exports on top of that derived from reduced customs delays, thus helping firms expand their foreign sales not only by facilitating border crossings but also by addressing information asymmetries.[43]

Furthermore, NEEC certification also seems to have had heterogeneous effects across products. In particular, effects have been larger on exports of textiles, industrial supplies, and capital and consumer goods, most of which can generally be considered to be time-sensitive.[44] This is consistent with the larger estimated impact on exports that are air-shipped, as reported at the bottom of the lower panel of Figure 3.13.

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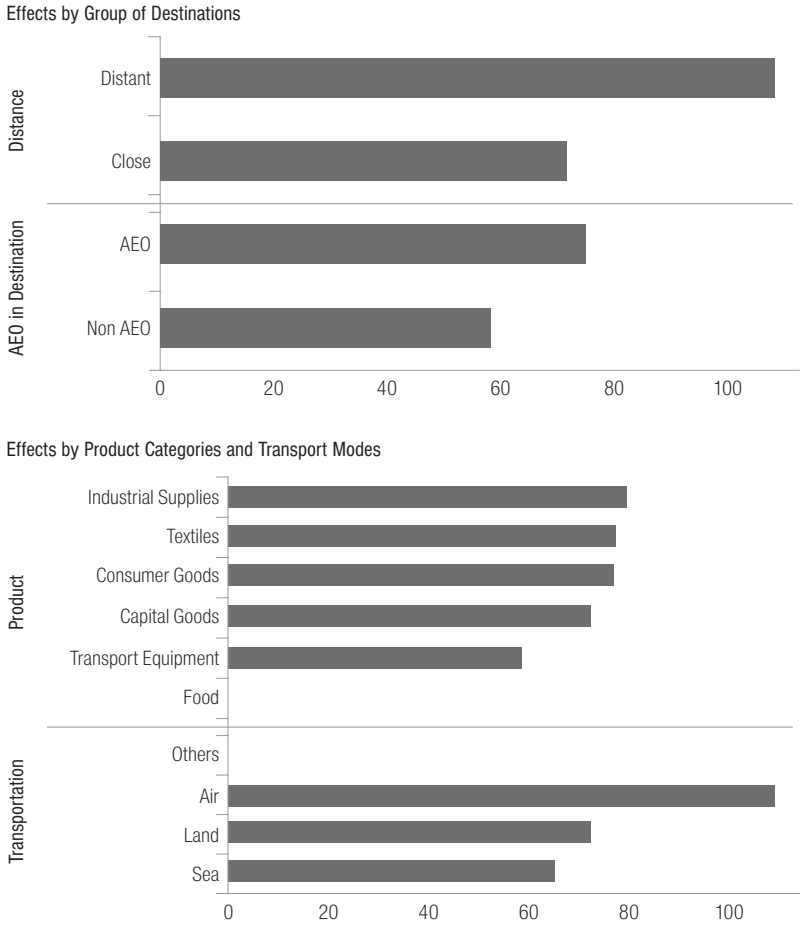
[41] Heterogeneous effects are estimated by modifying the baseline equation to include interactions of the main explanatory variable with the binary indicators that identify the relevant groups.

[42] These results also hold when imposing common products across destinations and when excluding the United States as a destination. In this regard, it is worth recalling that Mexican firms can get certified as C-TPAT in the United States and that Mexico did not have active AEO MRAs with partners during the sample period. Of course, an alternative explanation could be that buyers are certified as AEO in their countries. Unfortunately, data to explore this possibility are not available.

[43] Estimated impacts are similar on sales to destinations with high and low levels of terrorist activities as determined based on either the count of serious incidents or that of all incidents reported in the Global Terrorist Database.

[44] No significantly different effects are observed when estimating effects on exports of differentiated and nondifferentiated products as identified based on the classification proposed by Rauch (1999) or between complex or noncomplex goods as defined based on how diversified their production processes are in terms of inputs as suggested by Levchenko (2007). A possible explanation could be that most NEEC-certified firms specialize in exports of differentiated and complex goods. In fact, foreign sales of differentiated and complex goods accounted on average for more than 85 percent and 90 percent of NEEC firms' total exports over the sample period, respectively.

Figure 3.13 ■ Mexico: Impact of NEEC Certification on Firms' Exports by Destinations, Products, and Transportation Modes, 2011–2014



Source: Author's calculations based on data from Mexico's Tax Administration Service (*Servicio de Administración Tributaria* – SAT). Estimates presented in this figure are reported in Table 10 in Carballo, Schaur, and Volpe Martincus (2016a).
Note: The figure reports the estimated percentage impact of NEEC certification on firms' export growth rates for different sets of destinations, product categories, and transport modes. Close Destinations: Destinations whose distance to Mexico is up to the median of the respective distribution; Distant Destinations: Destinations whose distance to Mexico is above the median of the respective distribution; AEO: Destinations with an active Authorized Economic Operator Program; Non-AEO: Destinations without an AEO program. Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero. NEEC: *Nuevo Esquema de Empresas Certificadas* (New Scheme of Certified Firms).

3.5 External Validity: Are the Trade Effects of the Authorized Economic Operator Program Exclusive to Mexico? Evidence from Colombia

While Colombia's AEO program formally began operations in 2011, the first accreditations took place in 2015.[45] Currently, the country has 18 AEO exporting firms, 13 of which obtained their certification in 2015. As with Mexico, these firms are relatively large. Thus, in 2015 the average AEO firm exported 37.3 products to 11.6 destinations for more than US$25 million, whereas the respective figures for the overall average Colombian exporter were 4.7, 2.8, and US$3.4 million, respectively (upper panel of Figure 3.14). In aggregate terms, AEO firms, which only represented 0.1 percent of the total number of exporters in 2015, accounted for 1 percent of total exports, 11.4 percent of the number of exported products, and 27.1 percent of the total number of reached destinations.

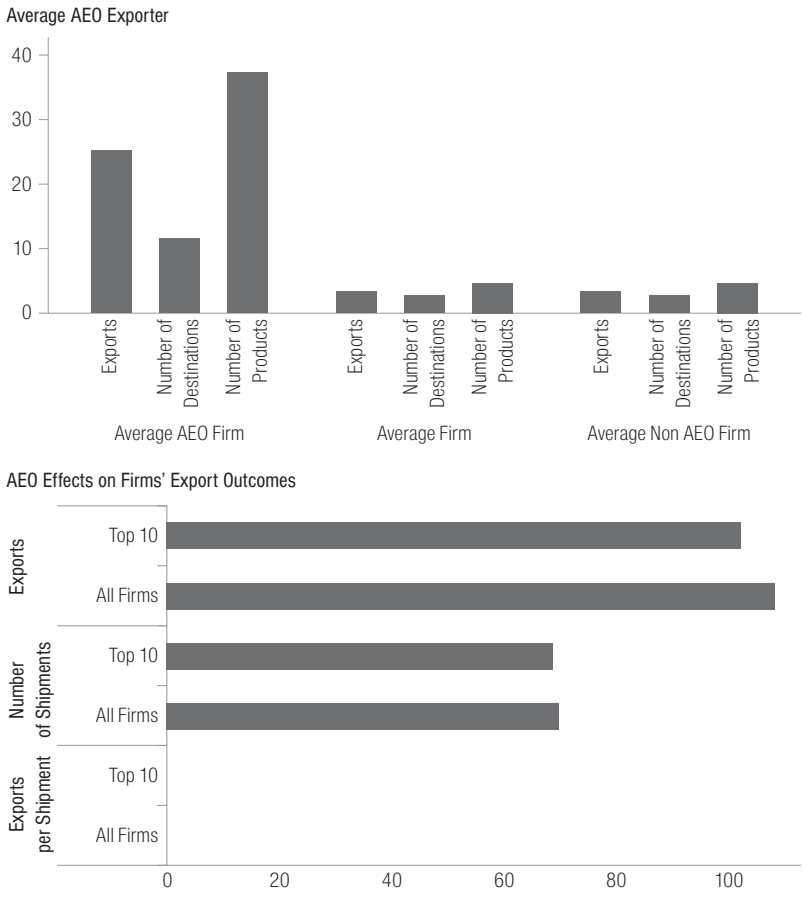
As with the Mexican counterpart, the effects of the Colombian AEO program on firms' export performance can be estimated by comparing the before-and-after certification change in AEO firms' export outcomes (i.e., 2014–2015) with the corresponding change in export outcomes of non-AEO counterparts, controlling for firm-level and product-destination-level factors. The upper panel of Figure 3.14 presents the results from this estimation, both when all exporting firms are considered and when the sample is restricted to those firms that were in the top 10th decile of the distribution of firm-level exports in the pre-program period and thus were initially more comparable to peers that later became certified. These estimates are in line with those for Mexico and consistently suggest that AEO firms experienced higher export growth, which is primarily driven by an increase in shipping frequency.

3.6 Summary and Conclusions

Security concerns in a context of increasingly segmented supply chains and expanding trade have led to an expansion of security-motivated certification programs around the world that seek to facilitate trade for trustworthy firms or AEOs. These programs provide participants with

[45] This happened after the AEO program was redesigned.

Figure 3.14 ■ Colombia: The Average Authorized Economic Operator Exporter and the Impact of Authorized Economic Operator Certification on Firms' Exports, 2014–2015



Source: Author's calculations based on data from Colombia's National Tax and Customs Directorate (*Dirección de Impuestos y Aduanas Nacionales de Colombia* – DIAN).
Note: The upper panel reports average export outcomes (total exports, number of products, and number of destinations) for all firms, Authorized Operator (AEO) firms, and non-AEO firms in 2015. Exports are expressed in millions of U.S. dollars. The lower panel presents the estimated percentage impact of the AEO certification on the growth rate of firms' export values, number of shipments, and export value per shipment, both when considering all firms and when restricting the sample to firms that initially belong to the top 10th percentile based on their total exports. Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

several advantages in the administrative processing of their shipments, including less frequent physical inspections and expedited customs clearance.

This chapter has presented evidence on the impact of Mexico's AEO Program, the NEEC, on firms' exports and imports. This evidence

suggests that the NEEC has resulted in increased firms' trade. This positive impact can be traced back to lower rates of physical inspections and thereby shorter times in customs for shipments. It is also associated to a certain extent with reduced information barriers due to the quality signaling associated with NEEC certification. Importantly, this effect does not come at the expense of noncertified exporters, so the program appears to have positively affected country-level exports.

Results also indicate that the NEEC has fostered expansion of foreign sales along both the destination intensive margin—NEEC-certified firms registered an increased number of shipments to already-served importing countries—and the destination extensive margin. Moreover, the impact seems to have been stronger on time-sensitive products such as textiles and consumer goods and industrial inputs.

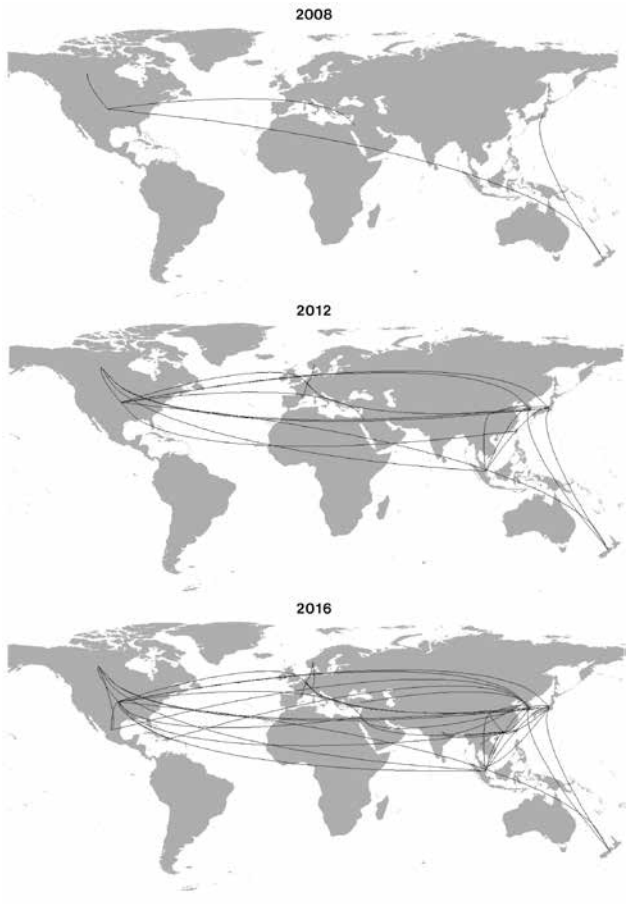
Needless to say, while findings for Colombia point in the same directions, these results cannot be linearly and mechanically extrapolated to other countries, especially those with different institutional contexts and trade realities. Additional research is needed to establish whether this is the case.

Finally, there are two issues regarding AEO programs' extensive margin or coverage that are worth discussing. First, to date, for the most part customs agencies are the only entities involved in the AEO certification process. Given that speeding up the processing of trade flows by customs agencies can be neutralized and even outweighed by the intervention of other relevant border agencies, it would be advisable to ensure that the latter also participate in that process as well as in the operation of the program, including, specifically, risk management (see more about inter-agency cooperation in Chapters 5 and 6).

Second, as shown above, the estimated impact of NEEC certification is larger for exports from firms that are also C-TPAT-certified, and thus benefit from expedited processing of shipments on both sides of the border instead of just one of them. This provides preliminary insights into the trade additionality of MRAs of AEO programs across countries.[46]

[46] Admittedly, as with the results of the program's impact evaluation in general, the size of the trade gains linkable to MRAs based on the Mexico-United States experience cannot be linearly assumed to be realizable for any other pair of countries. These gains might depend on several factors such as the degree of production integration between the economies in question. Also in this case, further analyses would be advisable to establish the extent to which other countries will benefit from the MRA.

Figure 3.15 ■ World: Authorized Economic Operator Programs' Mutual Recognition Agreements Over Time



Source: Prepared by the author based on WCO (2016).

It is therefore not surprising that several countries around the world and in Latin America and the Caribbean in particular are already moving in this direction, both on a bilateral and multilateral basis (Figure 3.15 and Table 3.3).

Table 3.3 ■ Latin America and the Caribbean: Status of Authorized Economic Operator Programs' Mutual Recognition Agreements, 2016

Countries	Status
Bolivia-Uruguay	Under negotiation
Brazil-Argentina	Under negotiation
Brazil-Uruguay	Under negotiation
Brazil-United States	Under negotiation
Costa Rica-Guatemala	Under negotiation
Costa Rica-Mexico	Under negotiation
Dominican Republic-Korea	Signed in April 2015
Dominican Republic-United States	Signed in December 2015
Mexico-Canada	Signed in May 2016
Mexico-China	Under negotiation
Mexico-Israel	Under negotiation
Mexico-Hong Kong SAR	Under negotiation
Mexico-Korea	Signed in March 2014
Mexico-United States	Signed in October 2014
Pacific Alliance (multilateral)	Under negotiation
Peru-Korea	Under negotiation
Peru-United States	Under negotiation
Uruguay-Korea	Under negotiation
Uruguay-Peru	Under negotiation
Uruguay-United States	Under negotiation

Source: Corcuera-Santamaría (2016).

>> Does One Size Fit All at the Border? Simplified Export Schemes for Small-Scale, Specialty Goods

4

4.1 Postal Services as Export Facilitators

Chapter 3 examined a trade facilitation initiative such as AEO programs that effectively addresses border issues for large firms running complex supply chains. Given their specific capabilities and needs, firms at other locations along a country's exporter spectrum may require different trade facilitation solutions. As shall be seen below, this is particularly the case for firms that produce and trade highly differentiated goods on a small scale.

In principle, postal services are uniquely well positioned to help facilitate this trade. The reasons are many. First, with more than 650,000 offices and 5.5 million employees worldwide, postal services represent the largest retail network on the planet.[1] Being that their offices are present virtually everywhere and are entry/exit points for international shipments, postal services tend to be associated with lower costs to get products to the country's border, especially in remote locations. Second, postal services take care of the logistics of transactions. In recent years, parcel and logistic services have accounted for almost 20 percent of postal revenues, which represents a 100 percent increase relative to the beginning of the 2000s.

[1] See Clotteau (2010) and Universal Postal Union (2013).

In particular, postal services processed more than 65 million international parcels, which are mostly up to 30 kilograms each. Third, postal services are linked with each other and with key actors in the trade process, such as customs agencies and airlines, by an electronic network (Post*Net). Governments around the world have recognized that these conditions can make postal services a critical interface for trade, and they have accordingly partnered with them to help firms access international markets. For instance, in the United States, the U.S. Postal Services is part of both the National Export Initiative and the "Made in Rural America" Initiative.

This chapter focuses on one such trade facilitation initiative involving postal services: the *Exporta Fácil* (Easy Export) Program. Originally launched in Brazil in 2001, *Exporta Fácil* was then implemented in Peru (2007), Uruguay (2009), Colombia (2010), and Ecuador (2011). It is currently being introduced in Paraguay, and diagnostic studies have been completed in Argentina, Chile, Bolivia, and Venezuela (Figure 4.1).

4.2 *Exporta Fácil*: A Trade Facilitation Solution for Producers of Specialty Goods

The *Exporta Fácil* Program is a streamlined export regime. Instead of having to go to the nearest customs branch, fill out a full export declaration, and hire customs brokers and freight forwarders, under *Exporta Fácil* firms can deliver their shipments to the local post office accompanied by a simplified export customs declaration (and other relevant documents as established by the regulations). They can also use the post office as both a customs broker that handles the processing of shipments and the respective documentation with customs, and as a logistic operator that ships the goods to the destination.[2]

From the point of view of firms, *Exporta Fácil* can therefore be viewed as a publicly provided intermediation scheme that helps reduce export entry sunk costs (for instance, those associated with learning trade-related administrative regulations and procedures) and per-period fixed costs (which can take the form of minimum freight, insurance, and customs brokerage charges and expenditures linked to paperwork and

[2] Private (express) carriers also provide logistic services whereby they receive or pick up packages and deliver them to addressees in final destinations. These shipments also typically require only a simplified customs declaration.

Figure 4.1 ■ South America: The *Exporta Fácil* Program

Source: Prepared by the author based on Messere (2014) and information provided by *Exporta Fácil* country teams.
Note: EF: *Exporta Fácil.*

monitoring of foreign customs operations). As such, the program can affect firms' export decisions. This is particularly true for small firms and specifically for those producing specialty goods on a small scale, not necessarily due to low productivity but rather to their product specialization.[3] The reason is twofold. First, for shipments to be eligible to be processed through *Exporta Fácil*, they have to be packed and declared to meet value and weight requirements, with the former varying across countries and

[3] See Holmes and Stevens (2014).

the latter generally being a maximum of 30 kilograms. Second, producers of highly differentiated and specialized goods tend to be more dispersed. These firms can therefore better benefit from the ubiquity of post offices to interact more and better with their customers, for example, by more easily shipping samples.

It is well known that trade intermediaries can help smaller firms participate in international markets.[4] Thus, intermediaries can reduce fixed entry costs and thereby lower the export entry threshold by taking advantage of their scope to spread those costs over shipments of many firms, possibly at the price of additional variable costs.[5] Specifically, as opposed to individual firms, intermediaries can distribute the costs of the resources and expertise required for supply-chain management, in general, and for filling out the appropriate export and customs documentation and handling the logistics of the shipments, in particular, across several firms, products, and destinations.

How intermediation services affect firms' export behavior generally depends on fixed direct export costs, fixed indirect export costs, variable trade costs, and productivity levels.[6] Given that fixed costs incurred when exporting directly are higher than those incurred when exporting indirectly through intermediaries, the most productive firms tend to choose direct exports, the less productive firms tend to enter foreign markets through intermediaries, and the least productive firms only supply the domestic markets.

The question then arises of why firms producing specialty goods on a small scale might not be able to take advantage of this solution provided by the market to sell abroad. There are two main reasons. First, intermediation introduces a middle man that adds its own profit margin to the prices and therefore lowers exports, thus making it harder for these firms to cover fixed costs. Second, in the case of small firms that are geographically dispersed and produce specialty goods on a small scale that are

[4] See Ahn, Kandelwahl, and Wei (2011), Akerman (2010), Bernard, Jensen, Redding, and Schott (2010), Bernard, Grazzi, and Tomasi (2015), and Blum, Claro, and Horstmann (2009, 2010).

[5] Alternative theories and empirical evidence emphasize the role of trade intermediation in solving information frictions. See Antràs and Costinot (2010), Petropoulou (2008), Rauch and Trindade (2002), and Rauch and Watson (2004).

[6] In standard trade models, the least productive firms do not enter export markets because their level of productivity does not allow them to reach a scale sufficiently large enough to overcome fixed costs of entry (Melitz 2003).

often tailored to individual buyers, adaptation and direct communication with these buyers regarding product specifications and sample shipping to verify and adjust designs and features will likely be required to ensure that the buyers' needs are met.[7] This can make standard intermediation unprofitable. Fixed costs related to intermediation between sellers and customers cannot be spread over these products with such a degree of specialization. In addition, the logistics of exporting small-scale specialty goods may not match the standard process set up by intermediaries taking advantage of scale economies.

This is precisely where a program such as *Exporta Fácil* can help. As referred to above, this program simplifies export documents and allows postal services to take over their management as well as the logistics for small shipments including samples, especially from small specialty good producers, but leave the communication of product details to sellers and buyers. Thus, *Exporta Fácil* can reduce the fixed export costs to below those corresponding to indirect export through intermediaries, especially for such shipments of highly differentiated products. As a consequence, some small firms that were excluded from foreign markets due to the high fixed costs associated with direct exports or the markup charged by intermediaries over the purchase price can now enter these markets. Furthermore, some small firms may switch from exporting indirectly through intermediaries to become direct exporters. In short, given that the program eliminates the double markup (i.e., producer and intermediary), this can be expected to result in increased export revenues.

[7] Assume that, as in the working paper version of Bernard, Grazzi, and Tomasi (2015), the fixed cost of directly exporting a product to a destination country is the sum of a global fixed cost that all firms incur when exporting independent of the destination and product, a fixed export cost that all firms incur when exporting to the country in question regardless of the product (e.g., some destinations are more difficult to enter than others due to more stringent import regulations, distribution networks, or information frictions), a fixed export cost that all firms incur when exporting any product in the sector in question regardless of the destinations (e.g., sectors differ in terms of how demanding the regulations are, what procedures their products are subject to, and the information barriers their trade is confronted with), and a product-destination-specific fixed export cost. The larger the share of this latter idiosyncratic fixed cost in total fixed costs, the lower are the margins to exploit economies of scope through intermediaries. This is most likely to be the case for specialty, highly differentiated products from small firms, which are often designed and tailored to individual customers and are particularly demanded in destinations that value their quality.

These post offices trade facilitation services are especially relevant for developing economies where there are many products that are handmade, produced on a small scale, and fill a niche or depend on key local inputs such as precious metals, know-how, and even cultural heritage. For instance, as shall be seen below, in Peru these products include specialty artisan jewelry and apparel products that crucially hinge upon highly localized inputs such as silver and alpaca and allow for tailoring to consumers' tastes (e.g., design and specific patterns). Of course, despite being functional for exporting these goods, *Exporta Fácil* cannot be expected to generate a major change in a country's aggregate foreign sales or to induce a substantial variation in its GDP. This will become evident with the descriptive statistics and the working sample presented below. In line with the arguments above, however, *Exporta Fácil* can instead allow for innovations along the export extensive margin in terms of firms, products, or destinations, and a geographical spread of their domestic origins. In other words, *Exporta Fácil* can make it possible for more actors from more regions to participate in international markets.

4.3 Case Study: Easy Exporting from Peru

4.3.1 The Exporta Fácil Program

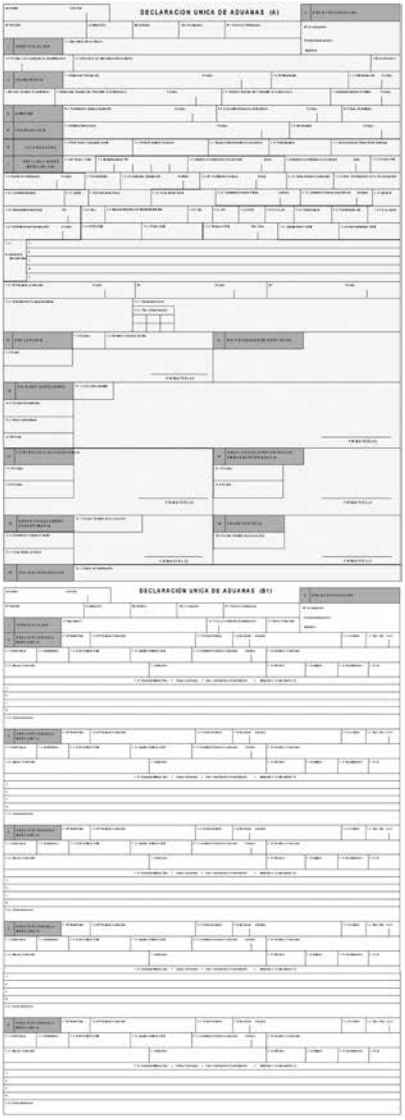
Under Peru's regular export regime, and in line with the generic description above, exporters generally have to fill out several documents and a full customs export declaration; take their goods to the customs facilities or hire a company to do so and incur the costs involved; typically use the services of customs brokers to deal with customs procedures, also at a cost; and identify and contract with a freight company to ship these goods to their final destination abroad. Figure 4.2 (left panel) shows a typical regular export declaration (*Declaración Única de Aduanas* - DUA) in Peru. Figure 4.3 shows the location of customs offices across the country (left panel).

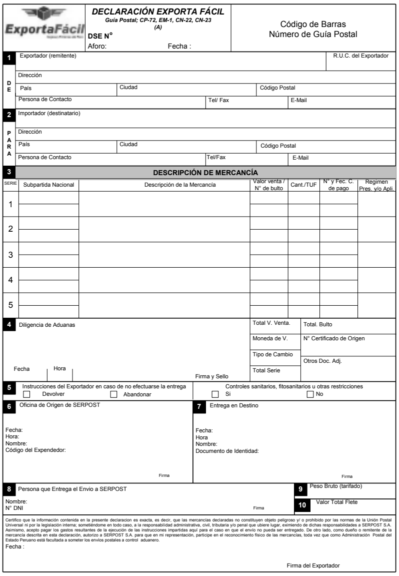
In July 2007, the Peruvian government launched the *Exporta Fácil* program.[8] This program aims to facilitate trade by streamlining administrative procedures for exports shipped by post offices that meet certain conditions (i.e., shipments up a certain size). All formal firms—i.e., those registered with Peru's tax agency (*Superintendencia Nacional de*

[8] See SUNAT (2009).

Figure 4.2 ■ Peru: Typical Regular Export Declaration (DUA) and Typical Simplified Postal Export Declaration (DEF)

DUA	DEF





ExportaFácil

DECLARACIÓN EXPORTA FÁCIL
Guía Postal; CP-72, EM-1, CN-22, CN-23
(A)
DSE N°
Aforo: Fecha :

Código de Barras
Número de Guía Postal

1 Exportador (remitente) | R.U.C. del Exportador
DE
Dirección
País | Ciudad | Código Postal
Persona de Contacto | Tel/ Fax | E-Mail

2 Importador (destinatario)
PARA
Dirección
País | Ciudad | Código Postal
Persona de Contacto | Tel/Fax | E-Mail

3 DESCRIPCIÓN DE MERCANCÍA

SERIE	Subpartida Nacional	Descripción de la Mercancía	Valor venta / N° de bulto	Cant./TUF	N° y Fec. C. de pago	Regimen Pres. y/o Apli.
1						
2						
3						
4						
5						

4 Diligencia de Aduanas
Fecha | Hora | Firma y Sello
Total V. Venta. | Total. Bulto
Moneda de V. | N° Certificado de Origen
Tipo de Cambio | Otros Doc. Adj.
Total Serie

5 Instrucciones del Exportador en caso de no efectuarse la entrega
☐ Devolver ☐ Abandonar
Controles sanitarios, fitosanitarios u otras restricciones
☐ Si ☐ No

6 Oficina de Origen de SERPOST
Fecha:
Hora:
Nombre:
Código del Expendedor:
Firma

7 Entrega en Destino
Fecha:
Hora
Nombre:
Documento de Identidad:
Firma

8 Persona que Entrega el Envio a SERPOST
Nombre:
N° DNI
Firma

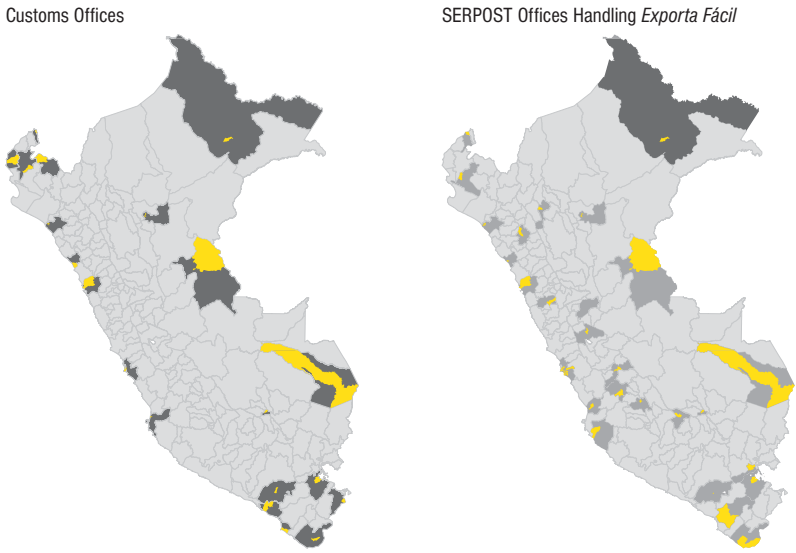
9 Peso Bruto (tarifado)
10 Valor Total Flete

Certifico que la información contenida en la presente declaracion es exacta, es decir, que las mercancías declaradas no constituyen objeto peligroso y/ o prohibido por las normas de la Unión Postal Universal ni por la legislación interna; sometiéndome en todo caso, a la responsabilidad administrativa, civil, tributaria y/o penal que obiere lugar, eximiendo de dichas responsabilidades a SERPOST S.A. Asimismo, acepto pagar los gastos resultantes de la ejecución de las instrucciones impartidas aquí para el caso en que el envío no pueda ser entregado. De otro lado, como dueño o remitente de la mercancía descrita en esta declaración, autorizo a SERPOST S.A. para que en mi representación, participe en el reconocimiento físico de las mercancías, toda vez que como Administración Postal del Estado Peruano está facultada a someter los envíos postales a control aduanero.
Fecha :

Firma del Exportador

Source: Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT).

Figure 4.3 ■ Peru: Location of Customs Branches and SERPOST Offices that Handle *Exporta Fácil* Shipments, 2014



Source: Prepared by the author based on information from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and public postal service (*Servicios Postales del Perú* – SERPOST).
Note: The figure shows the spatial distribution of customs branches (left panel) and SERPOST offices (right panel). Provinces (municipalities) with customs branches and SERPOST offices handling *Exporta Fácil* shipments are marked in dark gray (yellow).

Administración Tributaria – SUNAT)—can export under the program. However, the program explicitly targets small and medium-size enterprises.[9]

Exporta Fácil primarily involves reducing the number of forms to be completed, simplifying these forms, and implementing a user-friendly online interface for firms, which allows them to fill out the forms from their facilities.[10] More specifically, firms have to access the SUNAT website and complete a simplified customs document, the *Exporta Fácil* Declaration (*Declaración Exporta Fácil* - DEF), which is shown in the right panel of Figure 4.2. They then need to print this document and take it along with the goods to be shipped to the nearest authorized branch of Peru's postal

[9] See SUNAT (2015).

[10] SUNAT's *Exporta Fácil* online platform help firms classify their goods (i.e., assign the correct HS code) through a simple word-based search mechanism. SUNAT also provides support in this regard over the phone.

service (*Servicios Postales del Perú* - SERPOST), which is the public postal operator and the only one that can provide this service.[11] The location of these post offices that handle *Exporta Fácil* shipments is shown in the right panel of Figure 4.3. This means firms do not need to go to the major cities where customs branches are located to deliver their goods.

Two clear facts emerge from comparing the left and right panels of Figures 4.2 and 4.3. First, the DEF has a significantly lower number of fields to be filled out than the DUA, thus making it in fact a highly simplified customs declaration. Second, by exploiting the existing infrastructure of the designated postal operator, *Exporta Fácil* ensures a broader geographical coverage than the standard entry points associated with regular customs branches. Hence, on average, *Exporta Fácil* reduces the costs that firms have to incur to reach the country's borders.

In addition to reducing transport costs and paperwork and the associated costs, *Exporta Fácil* streamlines the administrative export process. This can be seen in Figure 4.4, which contrasts the *Exporta Fácil* procedure with Peru's regular export procedure. Further, firms using the program also benefit from assistance from SERPOST in completing these customs procedures. More precisely, SERPOST acts on behalf of the firms for customs matters and as a logistics operator by making arrangements for shipments to reach their final destinations. This frees firms from needing to hire a customs broker, as the logistics solution is already built into the scheme. Hence, the export process is much simpler under *Exporta Fácil* and requires substantially less involvement by exporters.

As mentioned above, shipments have to meet a number of conditions to be acceptable for processing through *Exporta Fácil*. While there are no limits on the number of DEFs that firms can submit, each DEF has to comply with the following requirements: (1) the total value cannot exceed US$5,000; (2) a shipment may consist of several packages, but none of them can exceed 30 kilograms as established by SERPOST for technological reasons related to shipping and handling; and (3) the shipment cannot have more than one buyer, i.e., firms must submit as many DEFs as the buyers they are selling to.[12]

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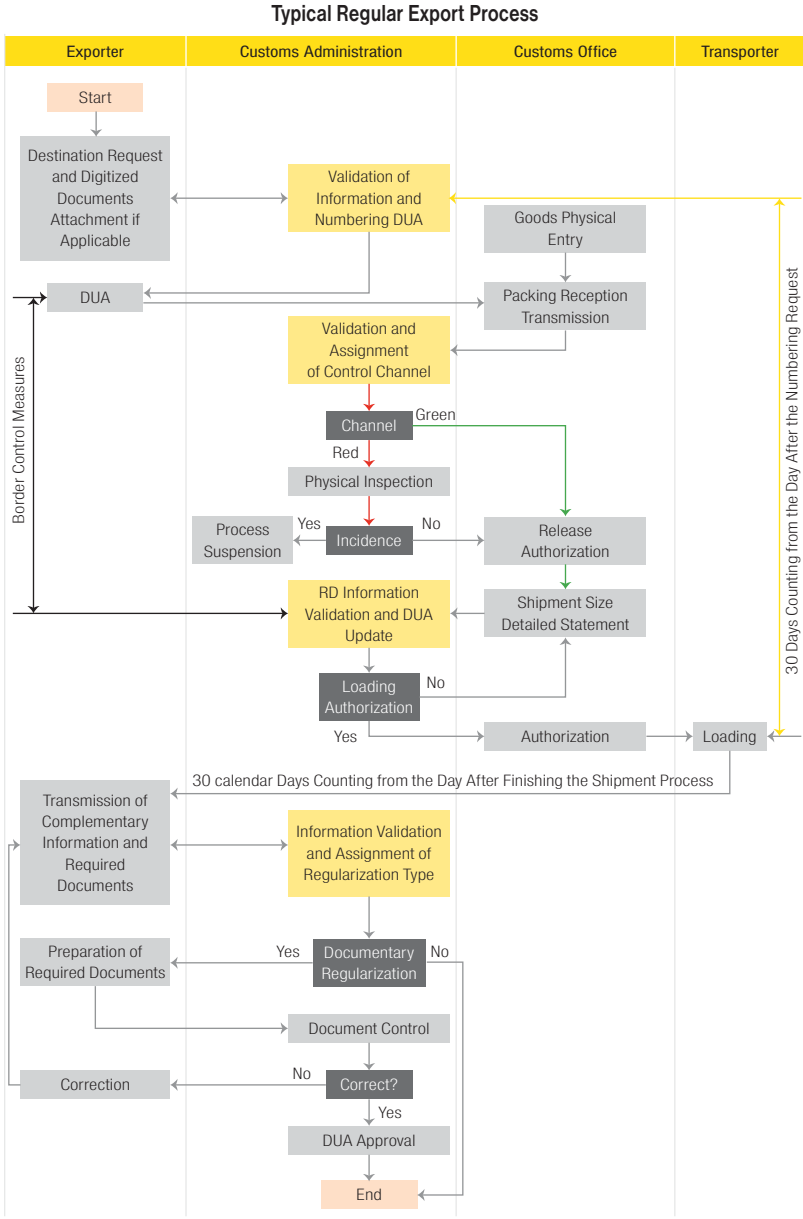
[11] If trade regulations establish that permits issued by other governmental agencies are required for the export in question, then firms have to obtain these permits and submit them together with the simplified customs declaration.

[12] See SUNAT (2009). The 30 kilogram limit has been imposed by SERPOST. According to SUNAT regulations, packages can weight up to 50 kilograms.

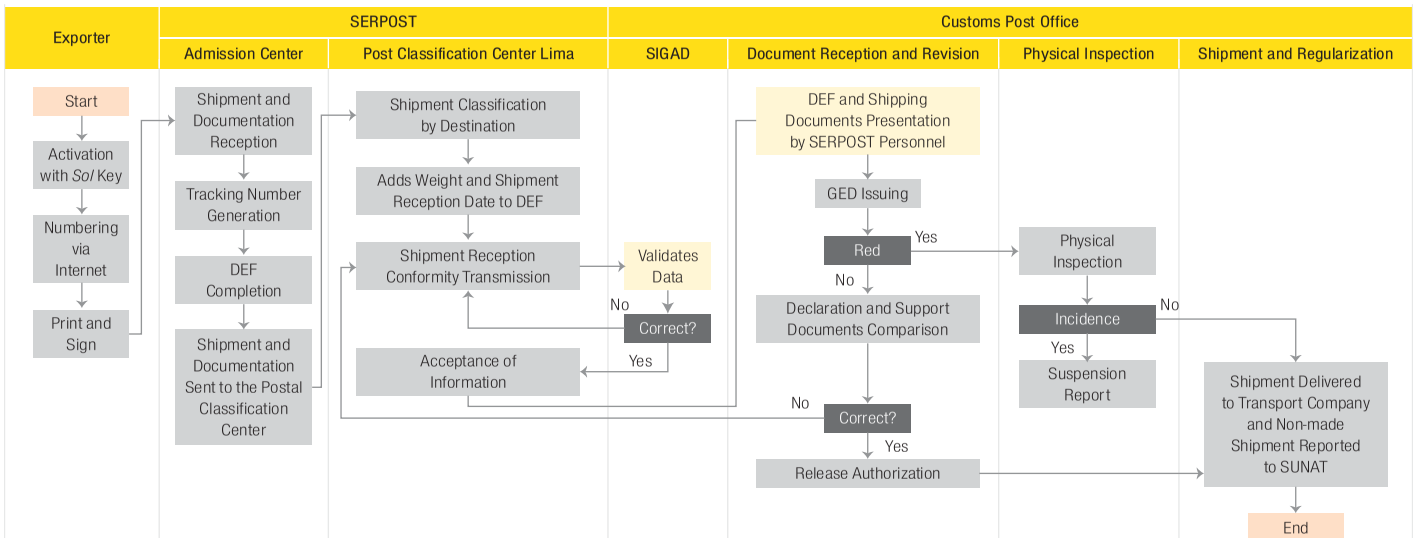
Figure 4.4 ■ Peru: Typical Regular Export Process and Typical *Exporta Fácil* Process



(continued)

Figure 4.4 ■ Peru: Typical Regular Export Process and Typical *Exporta Fácil* Process (*continued*)

Typical *Exporta Fácil* Process



Source: Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT).
Note: DEF: *Declaración Exporta Fácil* (*Exporta Fácil* Document); DUA: *Declaración Única de Aduanas* (Single Customs Document); GED: *Guía de Entrega de Documentos* (Guide for Document Delivery); RD: *Registro de la Diligencia* (*Diligence Registration*); SERPOST: *Servicios Postales del Perú* (Peru's Postal Services); SIGAD: *Sistema Integrado de Gestión Aduanera* (Integrated Customs Management System).

4.3.2 Data

SUNAT, SERPOST, and Peru's national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* - PROMPERU) kindly provided four databases that allow the simplified postal export scheme to be investigated exhaustively. The first database includes transaction-level export data from 1999 to 2014. This database covers all regular export transactions, i.e., all shipments not processed under simplified export regimes. Each record includes a firm's identification number, the product code (6-digit HS), the customs post (port/airport/land border) through which the shipment exits Peru, the destination country, the transport mode, the export value in U.S. dollars, and the quantity (weight) in kilograms.[13] The second database consists of all *Exporta Fácil* shipments processed since the inception of the program and therefore covers the period from 2007–2014. This database shares several fields with the previous one—i.e., crucially firm, product, and destination—, so that their data can be easily combined. The third database contains firm-level data on employment, location (municipality), sector of activity, and starting date.[14] Firms are also identified by the same identification number, in this case so that this dataset can be easily merged with the former two. The fourth database is a list of post offices that handle *Exporta Fácil* shipments along with information on their exact location and the precise date they began to operate with the program.

4.3.3 Exporta Fácil *in Peruvian Exports and Average Users*

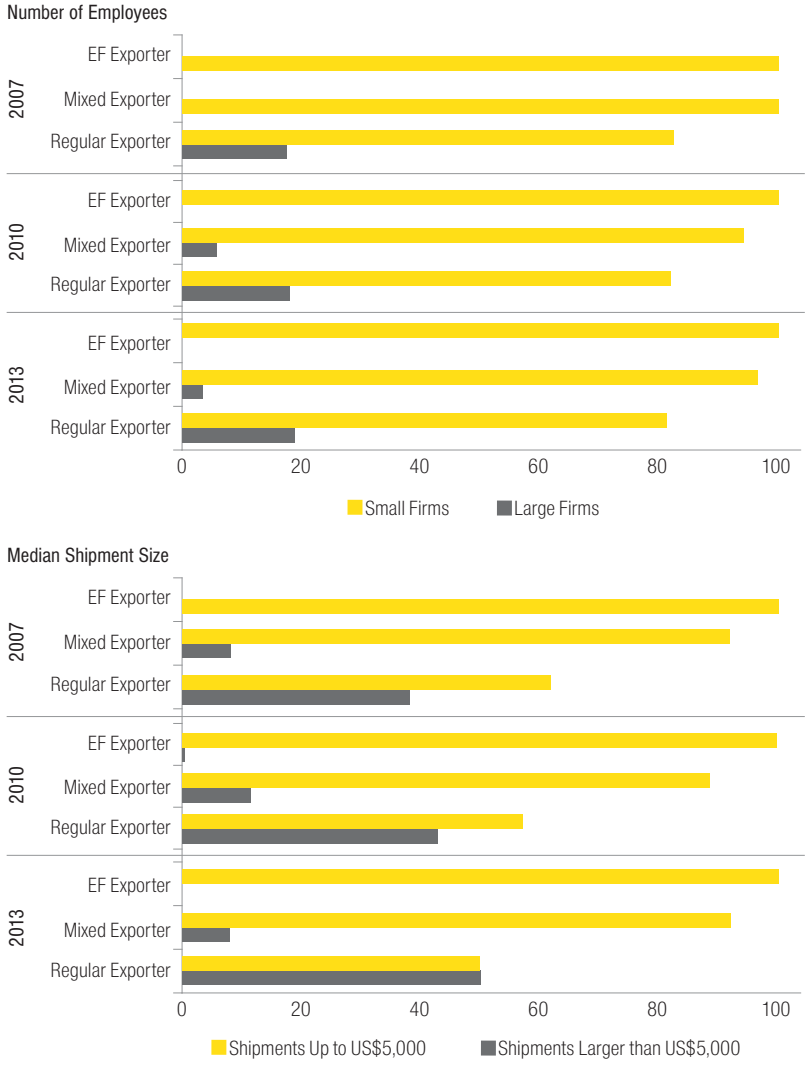
As discussed above, the use of *Exporta Fácil* is subject to factual and regulatory constraints. First, the program has been especially designed with small firms in mind. As shown in the upper panel of Figure 4.5, virtually all *Exporta Fácil* users have 50 employees or less. According to the firm classification used in Peru, these can be categorized as small firms.[15]

[13] Raw data are at the 10-digit HS level. However, given the changes in product classifications over the sample period, data have been aggregated at the HS 6-digit level to properly identify new products.

[14] Peru is administratively organized into 25 departments. These departments are, in turn, subdivided into provinces (195 in total) comprised of several municipalities (1,841 in total). Municipalities are the smallest political-administrative division and are required to have a minimum of 3,500 inhabitants.

[15] See Volpe Martincus and Carballo (2008).

Figure 4.5 ■ Peru: Number of Employees and Median Shipment Size by Exporter Type, Selected Years



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU).

Note: The upper panel reports the percentage share of *Exporta Fácil* exporters ("EF Exporters"), "Regular Exporters", and exporters using both Exporta Fácil and the regular channel (Mixed Exporters" that are small/large firms. Small Firms are those with 1-50 employees and Large Firms are those with more than 50 employees. The lower panel presents the percentage share of the same three groups of exporters whose median shipments are up to/larger than US$5,000.

Second, the value of each shipment cannot exceed US$5,000. The lower panel of Figure 4.5 reveals that more than half of the regular exporters have median values of shipments above this amount every year. Third, all *Exporta Fácil* exports are air-shipped.

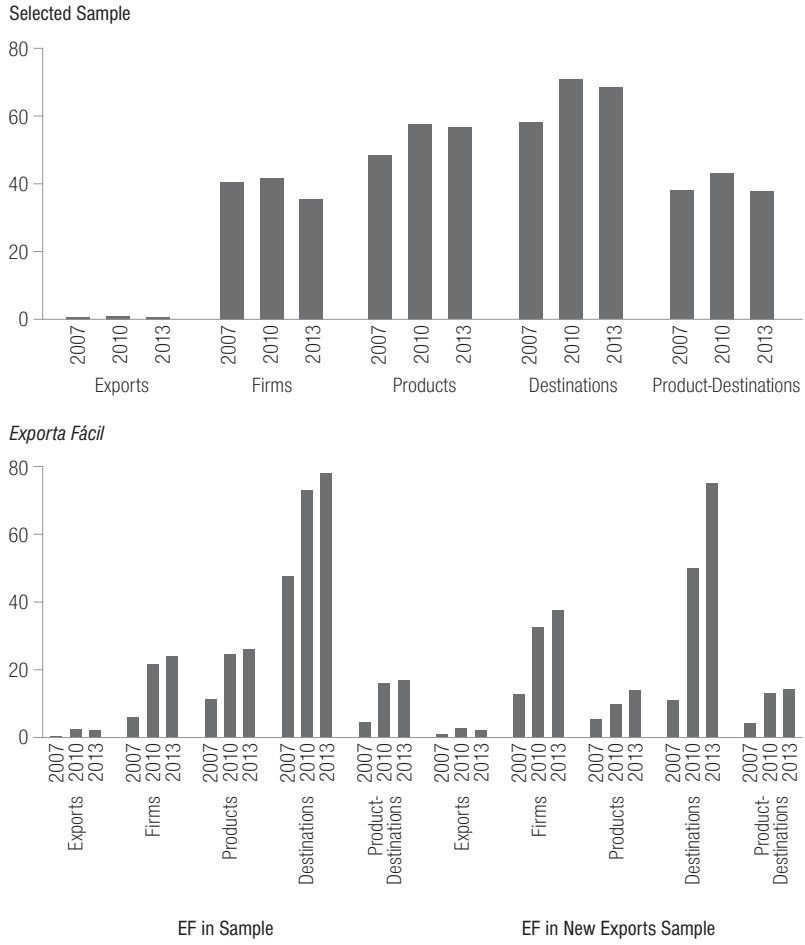
The analysis therefore focuses on small firms whose shipments have a median value below US$5,000 and are transported by plane. This helps create more comparable groups of regular and *Exporta Fácil* exporters, as top exporters tend to be several orders of magnitude larger than the typical exporter and several leading products are heavy commodities such as minerals and metals that are typically shipped by sea.[16]

Figure 4.6 presents the percentage share of air-shipped exports by small firms with less than US$5,000 in median shipments in Peru's total foreign sales (upper panel) and the percentage share of *Exporta Fácil* exports in that selected sample of air-shipped exports (lower panel). Unsurprisingly given the program's target, the selected sample accounts for a small share of total export values but it amounts to around one-third of the total number of exporters and product-destination combinations and more than half of the total number of exported products and export destinations (upper panel of Figure 4.6). While again only a small share of these export values were processed through *Exporta Fácil*, this channel was responsible for approximately a quarter of the respective exporters and products, more than three-quarters of the respective destinations, and almost one-fifth of the respective product-destination combinations (lower panel of Figure 4.6). Further, *Exporta Fácil* exporters make up almost 40 percent of the total number of new exporters in Peru every year and *Exporta Fácil* is involved in destination innovations for the country as whole, with a share of approximately 70 percent.

The share of *Exporta Fácil* varies substantially across sectors. This can be clearly seen in Figure 4.7, which shows the share of *Exporta Fácil* by HS 2-digit chapters. *Exporta Fácil* is a relevant export channel in sectors such as other base metals (i.e., powders) (Chapter 81); natural or

[16] In robustness-check exercises, the sample is additionally limited to firms in the primary and manufacturing sectors to avoid including intermediaries that are present among smaller firms (Volpe Martincus and Carballo 2008). The results of these robustness-check exercises confirm all main findings reported in this chapter.

Figure 4.6 ■ Peru: Percentage Shares of Selected Sample in Total Exports and of *Exporta Fácil* in Selected Sample, Selected Years

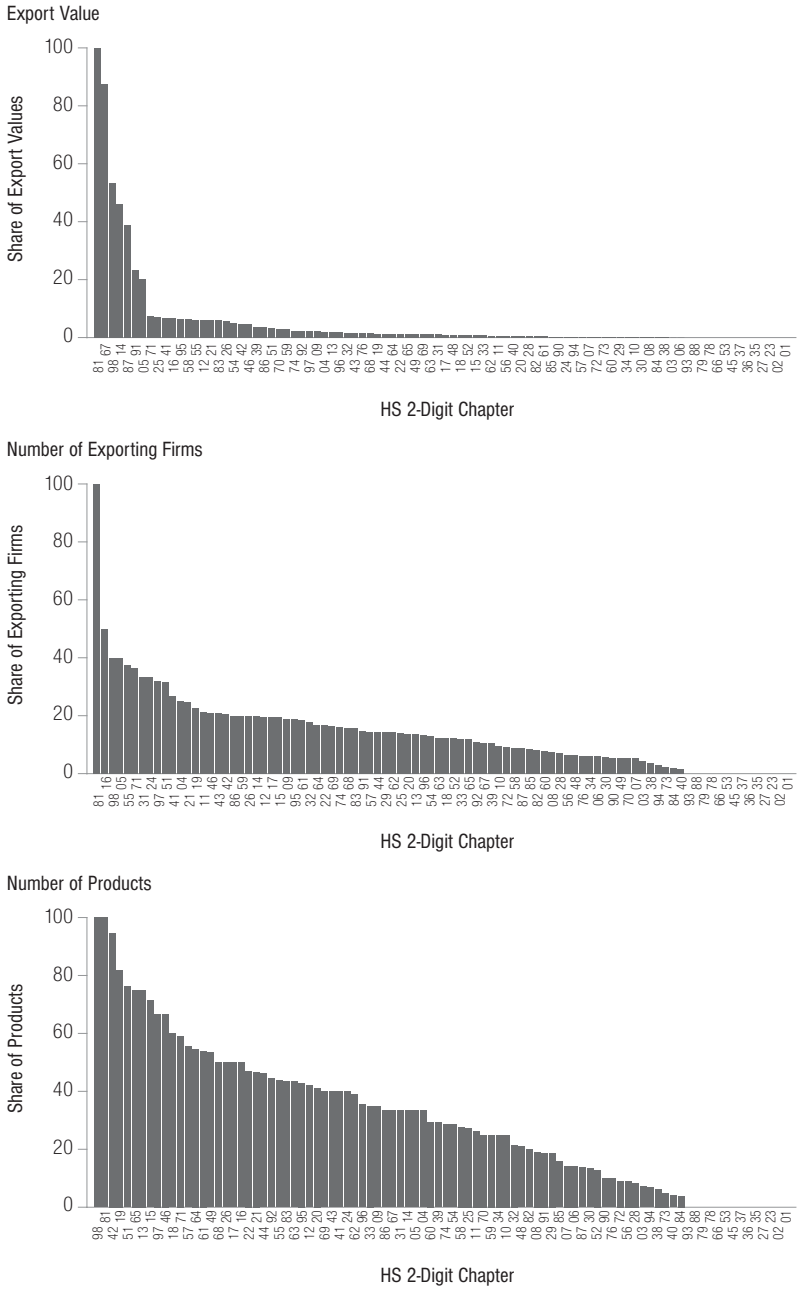


Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU).

Note: The upper panel reports the percentage share of total export aggregates accounted for by the selected sample (i.e., air-shipped exports by small firms with less than US$5,000 median shipments). The lower panel reports the percentage share of total export aggregates for the selected sample (i.e., air-shipped exports by small firms with less than US$5,000 median shipments) accounted for by *Exporta Fácil* (EF) exports, for both all exports and new exports.

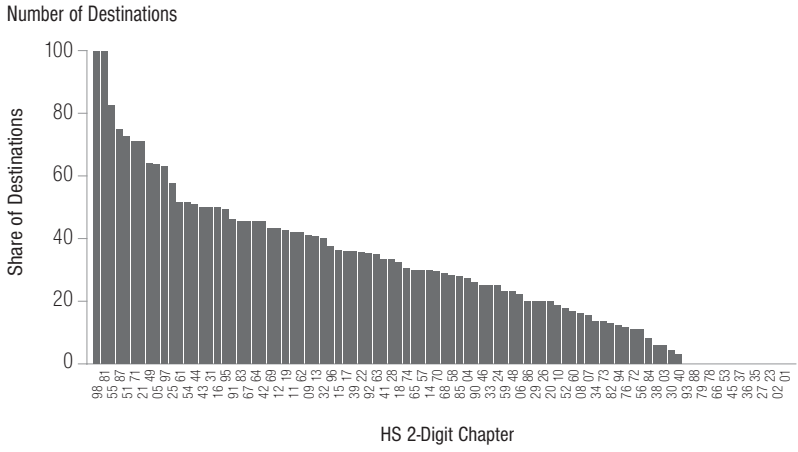
cultivated pearls, precious or semi-precious stones, precious metals, and imitation of jewelry (Chapter 71); works of art, collectors' pieces, and antiques (Chapter 97); and wool, fine or coarse animal hair, horsehair

Figure 4.7 ■ Peru: Percentage Share of *Exporta Fácil* by HS 2-Digit Chapters, 2014



(continued)

Figure 4.7 ■ Peru: Percentage Share of *Exporta Fácil* by HS 2 Chapters, 2014 (*continued*)



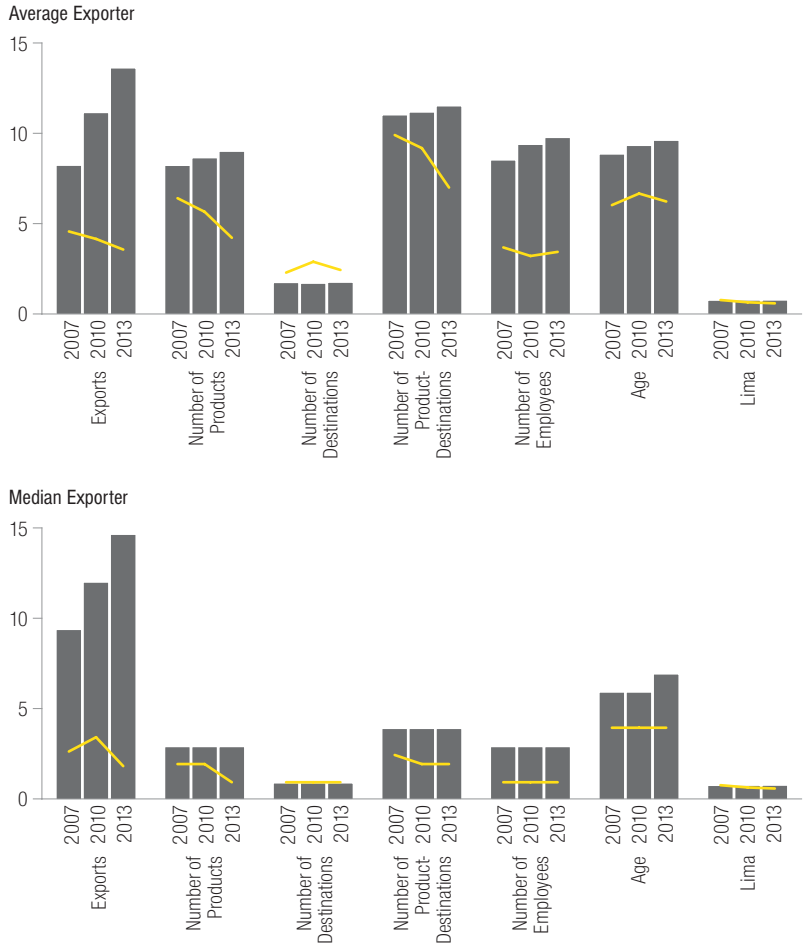
Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU).
Note: The figure shows the percentage share accounted for by *Exporta Fácil* of total export value, number of exporting firms, number of exported products, and number of reached destinations (y axis) for each HS 2 Chapter (x axis). Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

yarn, and woven fabrics (Chapter 51). But it does not play any role in sectors such as explosives, arms and ammunitions (Chapter 93); nickel, lead, and zinc (Chapters 75, 78, and 79); mineral fuels (Chapter 27); live animals (Chapter 1); meat (Chapter 2); pulp of wood (Chapter 47); and residues and wastes from food industries (Chapter 23). This is in line with what might be expected.

Figure 4.8 characterizes the average and median *Exporta Fácil* and regular exporters. Firms using *Exporta Fácil* are clearly smaller in terms of export values and number of employees, are less diversified in terms of products but similarly diversified (or more based on the mean) in terms of destinations, and tend to be located more in cities other than the country's capital of Lima.

The distributions of both *Exporta Fácil* and regular exporters across regions other than the capital exhibit clear differences (Figure 4.9). There are proportionally more *Exporta Fácil* firms in the *Sierra* region (e.g., Cajamarca, Cusco, and Junín) and noncentral coastal departments

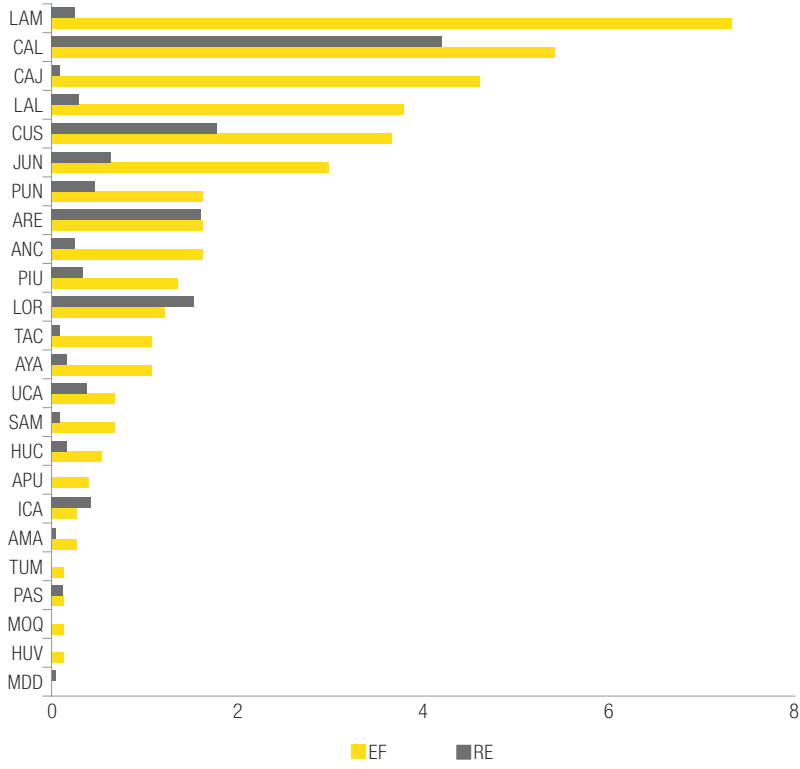
Figure 4.8 ■ Peru: Average and Median Regular and *Exporta Fácil* Exporters, Selected Years



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU).

Note: The upper panel reports the average export value, number of products, number of destinations, number of product-destination combinations, number of employees, age, and the share of Lima among possible locations in Peru for both regular exporters (gray bar) and *Exporta Fácil* exporters (yellow line). The lower panel presents the median export value, number of products, number of destinations, number of product-destination combinations, number of employees, age, and the share of Lima among possible locations in Peru for both regular exporters (gray bar) and *Exporta Fácil* exporters (yellow line). Exports are expressed in increments of US$10,000 for the average exporter and in increments of US$1,000 for the median exporter. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

Figure 4.9 ■ Peru: Geographical Distribution of *Exporta Fácil* and Regular Exporters, by Department, 2014

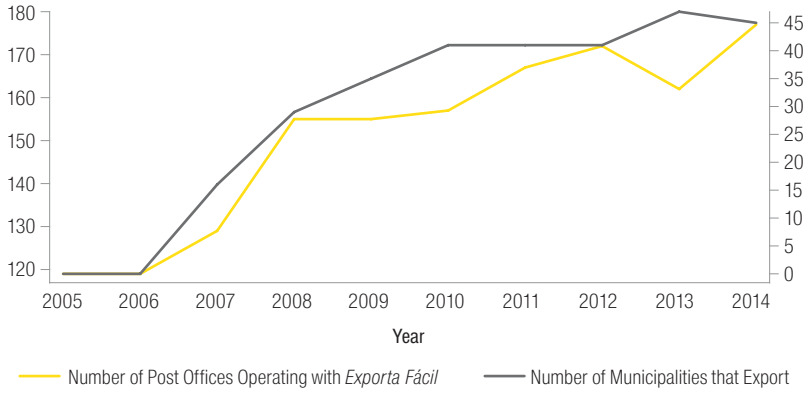


Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU).
Note: The figure shows the percentage share of each department in the total number of *Exporta Fácil* exporters (EF) and regular exporters (RE). Lima is not included. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

(e.g., Lambayeque and La Libertad).[17] Such geographical dispersion corresponds to that of firms that are highly specialized and face higher trade costs or sell niche products that depend on specialized local supplies. The

[17] Geographically, Peru is comprised of three natural regions: the *Costa* (coast), the *Sierra* (mountains), and the *Selva* (the Amazon region). The *Costa* region is comprised of the following departments: Callao, Ica, La Libertad, Lambayeque, Lima, Moquegua, Piura, Tacna, and Tumbes; the *Sierra* region is comprised of Ancash, Apurimac, Arequipa, Ayacucho, Cajamarca, Cusco, Huancavelica, Huánuco, Junín, Pasco, and Puno; and the *Selva* region is comprised of Amazonas, Loreto, Madre de Dios, San Martín, and Ucayali.

Figure 4.10 ■ Peru: Evolution of the Number of Exporting Municipalities and SERPOST Post Offices with *Exporta Fácil*, 2005–2014



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* - SUNAT), national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU), and public postal service (*Servicios Postales del Perú* – SERPOST).
Note: The figure shows the evolution of the number of exporting municipalities and the number of SERPOST post offices handling *Exporta Fácil* shipments from 2005 to 2014. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

aforementioned spatial pattern is also consistent with that of SERPOST post offices shown in Figure 4.3. Also worth noting in this regard, the number of exporting municipalities has increased alongside that of these post offices (Figure 4.10).

Table 4.1 reports the main products and their respective percentage shares in total *Exporta Fácil* exports and regular exports for selected years from 2007–2014. The upper panel highlights the fact that exports from firms using *Exporta Fácil* mainly consist of highly differentiated products such as apparel and jewelry along with toys, ceramic products, and works of art. Interestingly, the first two products were among the most important Chinese export products subject to intermediation in Hong Kong SAR and for which retailers and wholesalers play a major role in U.S. imports.[18] Selected regular exports exhibit similar specialization. Their foreign sales are also essentially composed of apparel and jewelry and, to a lesser extent, printed books and optical instruments. This is again consistent with activity patterns across firm groups within given

[18] See Feenstra and Hanson (2004) and Bernard, Jensen, Redding, and Schott (2010.

Table 4.1 ■ Peru: *Exporta Fácil* and Regular Exports, Main Products, Selected Years

	Main Product Categories											
	2007				2010				2013			
	Exporta Fácil		Regular Exports		*Exporta Fácil*		Regular Exports		*Exporta Fácil*		Regular Exports	
Rank	HS 2	Percentage Share	HS 2	Percentage Share	HS 2	Percentage Share	HS 2	Percentage Share	HS 2	Percentage Share	HS 2	Percentage Share
1	71	25.77	61	59.61	61	27.22	61	53.36	61	36.17	61	57.05
2	61	18.27	62	9.97	71	23.77	62	15.24	71	18.33	62	10.70
3	64	12.26	3	3.04	95	6.85	84	5.97	42	7.67	85	3.59
4	13	9.12	71	2.69	62	6.18	3	1.99	95	6.39	71	3.52
5	42	7.13	85	2.45	42	5.86	71	1.99	62	4.18	84	3.28
6	62	6.41	84	2.03	96	3.65	88	1.88	21	3.84	88	1.67
7	65	5.70	43	1.48	65	3.60	63	1.57	65	3.64	63	1.50
8	63	5.22	65	1.47	69	3.15	65	1.50	63	2.28	43	1.41
9	95	1.84	7	1.18	63	2.45	43	1.45	69	1.73	3	1.26
10	58	1.44	42	1.11	97	2.07	85	1.31	96	1.45	90	1.26
11	Others	6.83	Others	14.96	Others	15.20	Others	13.74	Others	14.30	Others	14.76

(continued)

Table 4.1 ■ Peru: *Exporta Fácil* and Regular Exports, Main Products, Selected Years (*continued*)

	Main Products in Relevant Categories											
	2007				2010				2013			
	Exporta Fácil		Regular Exports		*Exporta Fácil*		Regular Exports		*Exporta Fácil*		Regular Exports	
HS 2	HS 6	Percentage Share	HS 6	Percentage Share	HS 6	Percentage Share	HS 6	Percentage Share	HS 6	Percentage Share	HS 6	Percentage Share
61	611710	17.84	611710	2.13	611019	33.66	611019	4.92	611019	19.16	611019	4.51
61	610910	3.31	610910	28.89	610910	5.79	610910	27.50	610910	7.15	610910	18.05
62	621420	32.04	621420	0.89	621420	29.41	621420	0.51	621420	31.17	621420	2.05
62	620630	0.00	620630	11.33	620630	1.11	620630	16.16	620640	0.50	620640	13.71
71	711311	50.86	711311	18.03	711311	69.18	711311	16.25	711790	60.88	711790	54.13
71	711790	7.35	711790	28.86	711790	21.86	711790	42.94	711311	29.41	711311	18.72

Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU).

Note: The table reports the percentage share of total export values accounted for by the main product categories and the main individual products within three relevant product categories for *Exporta Fácil* exports and regular exports. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

Product Categories (HS 2-digit chapters)

3: Fish and Crustaceans, Mollusks and Other Aquatic Invertebrates; 7: Vegetables and Certain Roots and Tubers, Edible; 11: Products of the Milling Industry, Malt, Starches, Inulin, Wheat Gluten; 13: Lac, Gums, Resins and Other Vegetable Saps and Extracts; 21: Miscellaneous Edible Preparations; 42: Articles of Leather, Saddlery and Harness, Travel Goods, Handbags and Similar Containers, Articles of Animal Gut (other than Silk-worm Gut); 43: Furskins and Artificial Fur, Manufactures Thereof; 49: Printed Books, Newspapers, Pictures and Other Products of the Printing Industry, Manuscripts, Typescripts and Plans; 58: Fabrics, Special Woven Fabrics, Tufted Textile Fabrics, Lace, Tapestries, Trimmings, Embroidery; 61: Apparel and Clothing Accessories, Knitted or Crocheted; 62: Apparel and Clothing Accessories, Not Knitted or Crocheted; 63: Textiles, Made Up Articles, Sets, Worn Clothing and Worn Textile Articles, Rags; 64: Footwear, Gaiters and the Like, Parts of Such Articles; 65: Headgear and Parts Thereof; 69: Ceramic Products; 71: Natural, Cultured Pearls, Precious, Semi-precious Stones, Precious Metals, Metals Clad with Precious Metal, and Articles Thereof, Imitation Jewelry, Coin; 84: Nuclear Reactors, Boilers, Machinery and Mechanical Appliances, Parts Thereof; 85: Electrical Machinery and Equipment and Parts Thereof, Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, Parts and Accessories of Such Articles; 88: Aircraft, Spacecraft and Parts Thereof; 90: Optical, Photographic, Cinematographic, Measuring, Checking, Medical or Surgical Instruments And Apparatus, Parts and Accessories 95: Toys, Games and Sports Requisites Parts and Accessories Thereof; 96: Miscellaneous Manufactured Articles; 97: Works of Art, Collectors' Pieces and Antiques.

Products

611710: Shawls, Scarves, Mufflers, Mantillas, Veils and the Like; 610910: T-shirts, Singlets, Other Vests, Knitted or Crocheted, of Cotton; 611019: Jerseys, Pullovers, Cardigans, Waist-Coats Knitted or Crochet; 621420: Shawls, Scarves, Mufflers, Mantillas, Veils and the Like of Wool or Fine Animal Hair, Not Knitted or Crocheted; 620630: Women's or Girls' Blouses, Shirts, of Cotton; 620640: 620640 Women's or Girls' Blouses, Shirts, of Man-made Fibers; 711311: Articles of Jewelry and Parts Thereof, of silver, Whether or not Plated or Clad with other Precious Metal; and 711790: Other Imitation Jewelry.

sectors (i.e., larger standardized good producers versus smaller specialty good producers) in other countries.[19]

There is a key difference, though. Mass-produced apparel and jewelry may be exported through regular channels, whereas specialized products fall into the quantity and weight limits of postal exports to take advantage of the associated lower trade costs. This is illustrated in the middle panel of Table 4.1, which reports the percentage share of the most important product in a given sector by export mode. Thus, prominent among *Exporta Fácil* exports of apparel goods are shawls, scarves, mufflers, mantillas, and veils (along with jerseys, pullovers, cardigans, waist-coats and similar articles, knitted or crochet; gloves, mittens and mitts of wool knitted; and woman's or girls' coats of wool knitted). Only marginally present in these exports, if at all, are cotton t-shirts, singlets and other vests (along with women's or girls' blouses or shirts produced with man-made fiber and women's or girls' blouses or shirts made with cotton). The opposite holds for regular exports of apparel products. Table 4.2 complements this by listing the most important *Exporta Fácil* and regular export products in selected sample years along with their respective shares in total export values. Figures in Table 4.2 reaffirm the specialty nature of the goods shipped through *Exporta Fácil*.

Developed country markets, which have relatively higher demand for differentiated goods, account for a larger percentage share of *Exporta Fácil* exports than of regular exports. While on average these markets make up more than 70 percent of *Exporta Fácil* exports, they account for less than 40 percent of regular exports (Table 4.3). Hence, *Exporta Fácil* seems to be a channel for small firms to export highly differentiated goods produced in small batches to more sophisticated and demanding destinations.

4.4 The Impact of Simplified Postal Schemes on Exports: Evidence from Peru

4.4.1 Exporta Fácil and Regional Exports

As shown in Section 4.3, the number of Peruvian municipalities registering exports has increased along with the number of post offices authorized

[19] See Holmes and Stevens (2014).

Table 4.2 ■ Peru: *Exporta Fácil* and Regular Exports, Main Specific Products, Selected Years

2007					
Exporta Fácil			**Regular Exports**		
HS 6 Code	**Description**	**Percentage Share**	**HS 6 Code**	**Description**	**Percentage Share**
711311	Articles of jewelry and parts thereof of silver	13.11	610910	T-shirts, singlets and other vests, of cotton,	17.22
640399	Footwear with rubber soles, leather uppers	12.17	611020	Jerseys, pullovers, etc. of cotton, knitted	5.36
130219	Other vegetable saps and extracts, NES	9.12	610610	Women's or girls' blouses, etc. of cotton	3.88
711719	Imitation jewelry nes of base metal	6.05	611019	Jerseys, pullovers, cardigans, others	3.81
650590	Hats and other headgear, knitted or crocheted	5.54	610422	Women's or girls' ensembles, of cotton, knitted	3.15
420100	Saddlery and harness for animal, any material	4.88	611120	Babies' garments, etc. of cotton	3.01
630120	Blankets (excluding electric blankets)	4.60	611030	Jerseys, pullovers, etc. of man-made fibres	2.87
611710	Shawls, scarves, mufflers, mantillas, veils	3.26	030110	Live ornamental fish	2.13
611019	Jerseys, pullovers, cardigans, others	2.48	610821	Women's or girls' briefs and panties of cotton	2.08
711411	Articles of gold or silversmiths and parts of silver	2.29	610510	Men's or boys' shirts of cotton, knitted or crochet	1.98
Others		36.52	Others		54.51

(continued)

Table 4.2 ■ Peru: *Exporta Fácil* and Regular Exports, Main Specific Products, Selected Years (*continued*)

2010					
Exporta Fácil			Regular Exports		
HS 6 Code	Description	Percentage Share	HS 6 Code	Description	Percentage Share
711311	Articles of jewelry and parts thereof of silver	16.44	610910	T-shirts, singlets and other vests, of cotton,	14.68
611019	Jerseys, pullovers, cardigans, others	9.16	610610	Women's or girls' blouses, etc. of cotton	4.90
950390	Toys NES	6.60	611020	Jerseys, pullovers, etc. of cotton	3.87
711790	Imitation jewelry NES	5.19	611019	Jerseys, pullovers, cardigans, others	2.63
960200	Worked vegetable or mineral carving mat and art	3.59	611120	Babies' garments, etc. of cotton	2.49
611710	Shawls, scarves, mufflers, mantillas, veils	3.36	620630	Women's or girls' blouses, shirts, etc. of cotton	2.46
650590	Hats and other headgear, knitted or crocheted	2.99	610442	Dresses of cotton, knitted or crocheted	2.39
611120	Babies' garments, etc. of cotton	2.65	620442	Dresses of cotton	2.23
420100	Saddlery and harness for animal, any material	2.23	610620	Women's or girls' blouses, etc. of man-made fibers	2.22
611691	Gloves, mittens and mitts, of wool	2.03	610990	T-shirts, singlets, etc. of other textiles, NES	1.99
Others		45.76	Others		60.13

(continued)

Table 4.2 ■ Peru: *Exporta Fácil* and Regular Exports, Main Specific Products, Selected Years (*continued*)

2013					
Exporta Fácil			**Regular Exports**		
HS 6 Code	**Description**	**Percentage Share**	**HS 6 Code**	**Description**	**Percentage Share**
711790	Imitation jewelry NES	11.16	610910	T-shirts, singlets and other vests, of cotton,	10.30
611019	Jerseys, pullovers, cardigans, others	6.93	610990	T-shirts, singlets, etc. of other textiles, NES	4.70
950390	Toys nes	5.85	610620	Women's or girls' blouses, etc. of man-made fibers	4.37
711311	Articles of jewelry and pts thereof of silver	5.39	611020	Jerseys, pullovers, etc. of cotton	3.87
210690	Other food preparations, NES	3.77	611120	Babies' garments, etc. of cotton, knitted or crochet	3.51
611120	Babies' garments, etc. of cotton	3.48	610610	Women's or girls' blouses, etc. of cotton	2.74
611241	Women's or girls' swimwear of synthetic fibers	3.46	611019	Jerseys, pullovers, cardigans, others	2.57
420222	Handbags with outer surface of plastic sheeting	3.38	611030	Jerseys, pullovers, etc. of man-made fibres	2.57
611710	Shawls, scarves, mufflers, mantillas, veils	3.16	610462	Women's or girls' trousers, etc. of cotton	2.06
650590	Hats and other headgear, knitted or crocheted	2.99	711790	Imitation jewelry NES	1.91
Others		50.43	Others		61.42

Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU).
Note: The table reports the percentage share accounted for by the 10 most important HS 6-digit products of the total *Exporta Fácil* and regular export values for selected years of the sample period. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments. nes: not elsewhere specified.

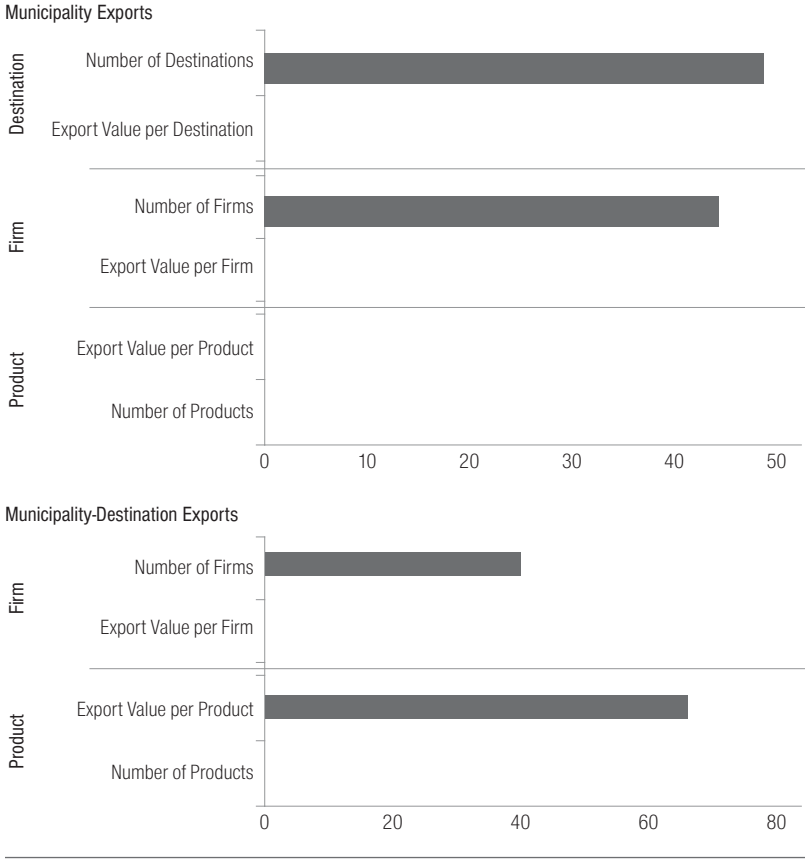
Table 4.3 ■ Peru: *Exporta Fácil* and Regular Exports, Main Destination, Selected Years

	Main Destinations											
	2007				2010				2013			
	Exporta Fácil		Regular Exports		*Exporta Fácil*		Regular Exports		*Exporta Fácil*		Regular Exports	
Rank	Code	Percentage Share	Code	Percentage Share	Code	Percentage Share	Code	Percentage Share	Code	Percentage Share	Code	Percentage Share
1	US	57.92	VE	34.21	US	31.82	VE	35.38	US	38.93	VE	32.11
2	CA	7.02	US	26.48	JP	10.97	US	23.22	JP	8.68	US	25.98
3	EC	5.81	ES	4.43	GB	6.84	CO	6.86	GB	7.24	CO	5.26
4	AU	5.69	FR	3.82	FR	6.73	CR	2.67	AU	7.23	EC	2.68
5	JP	3.48	MX	3.55	CL	5.40	MX	2.53	FR	5.82	MX	2.37
6	ES	2.47	CO	2.98	CA	4.59	DO	2.47	CL	4.76	FR	2.26
7	GB	2.45	GB	2.66	AU	4.53	ES	2.45	DE	3.27	CL	2.18
8	FR	2.24	IT	2.25	IT	3.15	IT	2.33	CA	3.15	ES	2.17
9	CR	1.84	EC	2.13	DE	2.92	FR	2.30	NO	2.44	DE	1.90
10	NO	1.43	JP	1.97	ES	2.66	DE	1.95	ES	1.69	CR	1.87
11	Others	9.65	Others	15.53	Others	20.39	Others	17.84	Others	16.81	Others	21.21

Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* - SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* - PROMPERU).

Note: The table reports the percentage share of the total export values accounted for by the main 10 destinations for Exporta Fácil exports and regular exports. Destinations: AR: Argentina; AU: Australia; CA: Canada; CH: Switzerland; CL: Chile; CN: China; CO: Colombia; CR: Costa Rica; DE: Germany; DO: Dominican Republic; EC: Ecuador; ES: Spain; FR: France; GB: United Kingdom; HK: Hong Kong SAR; IT: Italy; JP: Japan; MX: Mexico; NO: Norway; PA: Panama; RU: Russia; US: United States; VE: Venezuela. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

Figure 4.11 ■ Peru: Impact of *Exporta Fácil* on Municipality and Municipality-Destination Export, 2006–2014



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* – SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU), and public postal service (*Servicios Postales del Perú* - SERPOST). Estimates presented in this figure are reported in Table 5 in Carballo, Schaur, and Volpe Martincus (2016b).
Note: The upper panel reports the percentage share of the estimated impact of *Exporta Fácil* on export values accounted for by the estimated impacts on the number of firms and average export value per firm, the number of destinations and average export value per destination, and the number of products and average export value per product at the municipal level. The lower panel shows the percentage share of the estimated impact of *Exporta Fácil* on export values accounted for by the estimated impacts on the number of firms and average export value per firm and the number of products and average export value per product at the municipal-destination level. Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

to receive and process shipments through *Exporta Fácil*. More formally, Figure 4.11 presents econometric evidence on the impact of *Exporta Fácil* on different municipal export outcomes, both at the municipality and the municipality-destination level. Estimates at the municipal level are obtained

after netting out the influence of time-invariant, municipal-level factors and time-varying, department-level factors (e.g., differences over time across departments in product specialization, physical infrastructure, and other public policies). Estimates at the municipality-destination level are obtained after isolating the incidence of time-invariant municipal-destination-level factors, time-varying, department-level factors, and time-varying, destination-level factors (e.g., differences over time across destinations in terms of market access and demand patterns).[20] Overall, these estimates indicate that *Exporta Fácil* has been associated with larger municipal exports. This increase in exports can be traced back to an increase in the number of destinations reached and especially the number of firms that export. Specifically, some municipalities appear to have entered new destinations thanks to *Exporta Fácil*. In contrast, no distinguishable systematic effects are observed on the respective intensive margins. To sum up, in line with what could be expected from such a program (see Sections 4.2 and 4.3), *Exporta Fácil* has helped municipalities venture into foreign markets and expand as well as diversify their exports.

4.4.2 Firms' Export Decisions, Experimentation, and Learning through the Lens of Exporta Fácil

By helping small specialized firms penetrate international markets, *Exporta Fácil* can generate significant benefits. New-to-export firms generally need to acquire export-specific knowledge and, in particular, learn about the

[20] The baseline equation at the municipality-year level has as the dependent variable (the natural logarithm of) the export value (or other export outcomes) and as the main explanatory variable a binary indicator that takes the value of one if *Exporta Fácil* is used and zero otherwise along with municipality and department-year fixed effects. The baseline equation at the municipality-destination-year level has as the dependent variable (the natural logarithm of) the export value (or the other export outcomes) and as the main explanatory variable a binary indicator that takes the value of one if *Exporta Fácil* is used and zero otherwise along with municipality-destination, department-year, and destination-year fixed effects. Given that the actual use of *Exporta Fácil* can be endogenous to exports, this actual use is instrumented with the presence of post offices that are entry points for *Exporta Fácil* in the province to which the municipality in question belongs in the equation estimated on municipal-year-level data and with this variable interacted by an indicator of the share of air transportation in Peru's total exports to the destination (recall that *Exporta Fácil* exports are air-shipped) in the equation estimated on municipal-destination-year level data.

appeal of their products in specific destinations.[21] By reducing the entry barriers to these markets and thereby making it easier to develop export capabilities and add and drop products, *Exporta Fácil* can facilitate experimentation and thus learning. Learning about own-export profitability and market-specific demand for particular products through this mode can, in turn, substantially affect firms' export outcomes. Specifically, it can translate into higher initial regular (i.e., non-*Exporta Fácil*) export values. In addition, experience gained through *Exporta Fácil* may result in higher survival rates of subsequent regular exports.[22] Further, learning can lead to spillovers. Thus, information generated through these export activities can spread to other firms producing similar goods, especially when they co-locate with *Exporta Fácil* users, and may therefore favor the internationalization of additional firms.[23]

This section establishes a number of facts on how streamlining of export procedures and provision of intermediation services associated with *Exporta Fácil* can affect export decisions, experimentation, and learning, both within and across firms.

Fact 1: Exporta Fácil exporters start smaller than their regular peers.

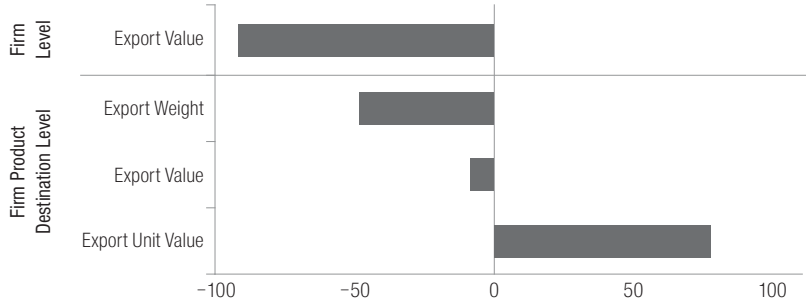
As discussed above, *Exporta Fácil* is likely to imply a reduction in both sunk-entry and per-period fixed costs. This would translate into a lower size threshold above which firms can export and, accordingly, in lower initial firm export levels.[24] This is confirmed by estimation results reported in Figure 4.12, which indicate that initial pure *Exporta Fácil* exporters actually enter smaller than their regular peers (and also relative to firms that combine regular and *Exporta Fácil* sales), both at the firm-level and at the firm-product-destination level and even within narrowly defined

[21] See Artopolous, Friel, and Hallak (2013), Johanson and Vahlne (1997), and Timoshenko (2015).

[22] Albornoz, Calvo Pardo, Corcos, and Ornelas (2012) show how experimentation and thereby learning can lead to sequentiality in firms' exports.

[23] See Koenig (2009) and Koenig, Mayneris, and Poncet (2010). For large firms the scheme may be interesting because it facilitates small emergency shipments in case parts are missing or demand is higher than expected (Hummels and Schaur 2010). An interpretation of these services consistent within the framework of specialized products is that they are differentiated in the ability to arrive on time exactly when needed via post-office-facilitated export procedures.

Figure 4.12 ■ Peru: *Exporta Fácil* and Initial Export Values, 2006–2014



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* - SUNAT), national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU), and public postal service (*Servicios Postales del Perú* – SERPOST). Estimates presented in this figure are reported in Table 6 in Carballo, Schaur, and Volpe Martincus (2016b).
Note: The figure reports the conditional average percentage difference in initial regular and *Exporta Fácil* export values, both at the firm level and the firm-product-destination level (and in initial weight and unit values for the latter). Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

sectors and geographical areas and netting out time-varying product or destination factors.[25] This holds true both in terms of values and volume (weight). On the other hand, *Exporta Fácil* exports have higher unit values even within product-destination combinations. Overall, these results imply that postal services help small firms such as those that produce highly differentiated, specialty products on a small scale to penetrate and operate in international markets.

[24] Entry export values have been used previously in the literature as a proxy for sunk export costs (Freund and Pierola 2010). Bernard and Jensen (2007) show that, in steady state, high sunk entry costs are associated with low entry and exit rates. Consistently, Bernard, Grazzi, and Tomasi (2015) use the minimum of the entry and exit rates as a proxy for product-level sunk costs.

[25] The two baseline equations are estimated on new export flows, i.e., flows in their first year of appearance. The baseline equation at the firm-year level has as a dependent variable (the natural logarithm of) the export value and as the main explanatory variables a binary indicator that takes the value of one if only *Exporta Fácil* is used and zero otherwise, and a binary indicator that takes the value of one if both the *Exporta Fácil* and the regular export channels are used and zero otherwise, along with (the natural logarithm of) firm-level control variables (i.e., number of employees and age) and municipality-year and (ISIC 4-digit) sector-year fixed effects. The baseline equation at the firm-product-destination-year level has as a dependent variable (the natural logarithm of) the export value, export weight, or unit value, and as the main explanatory variables a binary indicator that takes the value of one if only *Exporta Fácil* is used and zero otherwise,

Fixed entry export costs can vary across sectors and destinations.[26] It can then be expected that the entering export value and, in particular, the reduction in that value made possible by *Exporta Fácil*, differ across them. In order to explore this, estimations have been carried out allowing for different *Exporta Fácil* effects on initial exports across (main) sectors (i.e., HS 2-digit products) and destinations. Estimates corroborate that there are indeed significant differences in how smaller firms can start in these export markets thanks to *Exporta Fácil*. Thus, *Exporta Fácil* is associated with significant reductions in initial export values, particularly in sectors such as apparel, ceramic products, and musical instruments, and in destinations such as Austria, Brazil, Mexico, the Netherlands, Sweden, and the United States.

Fact 2: Exporta Fácil exporters experiment more than their regular peers.

Firms introduce new products to new markets with a significant amount of uncertainty. If *Exporta Fácil* lowers trade costs, especially for small volumes, then the associated postal services lend themselves to testing new markets. *Exporta Fácil* is therefore likely to systematically facilitate the introduction of new export products or reaching new export destinations. Estimates shown in the left panel of Figure 4.13 corroborate that this is indeed the case.[27] Further, consistent with testing being more prominent among *Exporta Fácil* exporters, the right panel of Figure 4.13 shows that their entry and exit rates are higher than their regular (and mixed regular-*Exporta Fácil*) counterparts in given export markets.[28] For welfare and policy benefits, this raises the question of

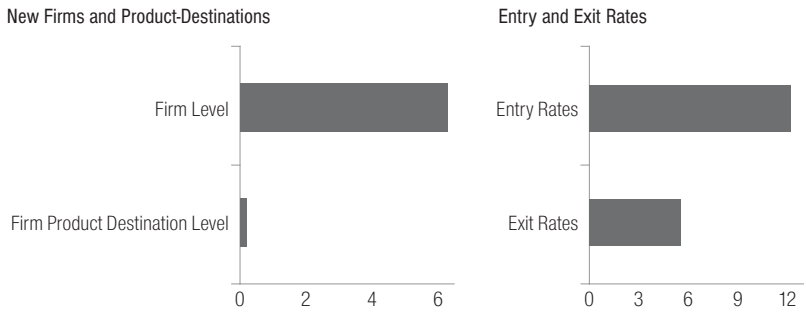
and a binary indicator that takes the value of one if both the *Exporta Fácil* and the regular export channels are used and zero otherwise, again along with (the natural logarithm of) firm-level control variables (i.e., number of employees and age) and municipality-year, (ISIC 4-digit) sector-year, and product-destination-year fixed effects.

[26] See Das, Roberts, and Tybout (2007), Eaton, Kortum, and Kramarz (2011), and Moxnes (2010).

[27] This is examined by regressing a binary indicator that takes the value of one if the export flow is new (either for the firm or the country as a whole) on the *Exporta Fácil* indicator along with municipality-year and (ISIC 4-digit) sector-year fixed effects in the estimation at the firm-year level and firm-year fixed effects and product-destination-year fixed effects in the estimation at the firm-product-destination-year level.

[28] Entry and exit rates at the HS 2-digit product-destination-year level are regressed on a binary indicator that takes the value of one if only *Exporta Fácil* is used and zero otherwise, a binary indicator that takes the value of one if both the *Exporta Fácil* and the regular export channels are used and zero otherwise, and HS 2-digit product-year and destination-year fixed effects.

Figure 4.13 ■ Peru: Experimentation through *Exporta Fácil*, 2006–2014



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* - SUNAT) and national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* - PROMPERU). Estimates presented in this figure are reported in Tables 7 and 8 in Carballo, Schaur, and Volpe Martincus (2016b).
Note: The left panel reports the estimated effect (in percentage points) of *Exporta Fácil* on the probability that a firm starts exporting or starts exporting a new product to a new destination, whereas the right panel presents the estimated percentage effect of *Exporta Fácil* on the entry and exit rates at the HS 2-digit product-destination level. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

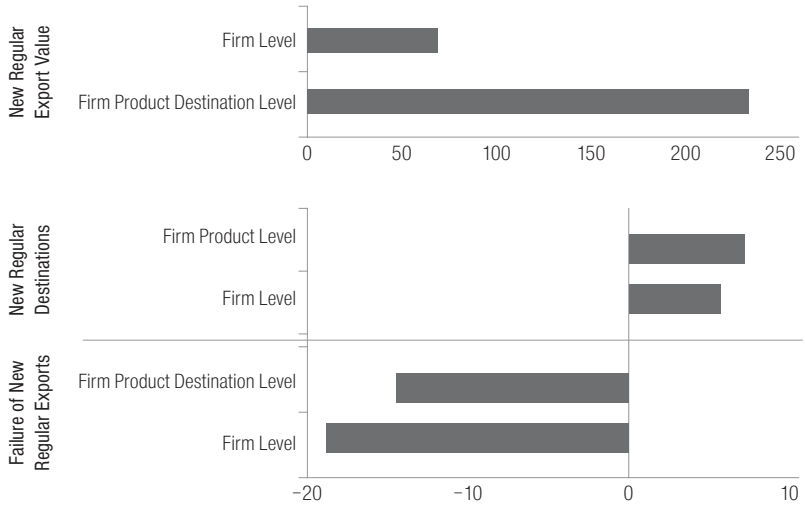
whether these small firms are able to learn and grow to become stable exporters that can take advantage of international markets. The question is explored next.

Fact 3: Exporters learn from their Exporta Fácil experience. Those that become regular exporters start larger, survive longer, and diversify destinations.

Firms that enter small through postal exports can learn to become stable exporters that grow and diversify. Figure 4.14 presents evidence in this regard as obtained by comparing the initial level, the survival rate, and the destination extensive margin of new regular exports that were previously exported through *Exporta Fácil* with those of counterparts directly exported through the regular channel.[29]

[29] At the firm-year level, this is assessed by regressing (the natural logarithm of) the value of the first regular export, a binary indicator that takes the value of one if the firm exports in the period following its first regular export and zero otherwise, and a binary indicator that takes the value of one if the firm adds a new destination in the period following its first regular export and zero otherwise on a binary indicator that takes the value of one if the firm used *Exporta Fácil* in the year before becoming a regular exporter and zero otherwise, along with (the natural logarithm of) firm-level control variables (i.e., number of employees and age) and municipality-year and (ISIC 4-digit) sector-year fixed effects.

Figure 4.14 ■ Peru: *Exporta Fácil* and Initial Regular Export Values, Addition of Regular Destinations, and Failure Rates, 2006–2014



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* - SUNAT), national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* - PROMPERU), and public postal service (*Servicios Postales del Perú* - SERPOST). Estimates presented in this figure are reported in Tables 9, 10, and 12 in Carballo, Schaur, and Volpe Martincus (2016b).
Note: The figure shows the conditional average percentage difference in export values, the percentage difference in the probability to add a new destination, and the percentage difference in the probability to fail between initial regular exports with previous Exporta Fácil experience and without this experience. Sample: Air-shipped exports by small firms with less than US$5,000 median shipments.

Estimates reported in this figure reveal that previous export experience through *Exporta Fácil* tends to be associated with both larger initial regular exports and a lower failure rate of these exports both at the firm and firm-product-destination level. Interestingly, unit values of

At the firm-product-destination (firm-product)-year level, this is assessed by regressing (the natural logarithm of) the value (weight or unit value) of the first regular export and a binary indicator that takes the value of one if the firm exports the product to the destination in question in the period after being exported through the regular channel and zero otherwise (a binary indicator that takes the value of one if the firm adds a new destination in the period following its first regular export of the product in question and zero otherwise) on a binary indicator that takes the value of one if the firm used *Exporta Fácil* in the year before becoming a regular exporter and zero otherwise, along with firm-year and product-destination-year (the firm-level control variables and product-year, municipality-year and (ISIC 4-digit) sector-year) fixed effects.

new regular exports with *Exporta Fácil* antecedents are higher than those exported for the first time altogether. Moreover, exporters that became regular after resorting to the *Exporta Fácil* channel seem to be better prepared to diversify their destinations.[30] Again, this is consistent with the intuition that, in particular, small firms producing highly differentiated, small-batched, high-value-to-weight products and facing costly intermediation take advantage of the postal export regime to strengthen their competitive position and expand in foreign markets.

Fact 4: There are local spillovers from Exporta Fácil exports.

Export knowledge generated when venturing abroad through *Exporta Fácil,* although potentially smaller relative to that derived from direct export activities, may spread to other firms. Estimates shown in Figure 4.15 seem to suggest that trade facilitation induced by *Exporta Fácil* has indeed had a positive indirect effect, thus benefiting exports of firms others than those of the users themselves.[31] In particular, firms located in the same municipality as peers that exported a given product to a given destination through *Exporta Fácil* are more likely to start exporting this product-destination combination via the regular channel.

4.5 External Validity: Are the Export Effects Exclusive to Peru? Evidence from Brazil

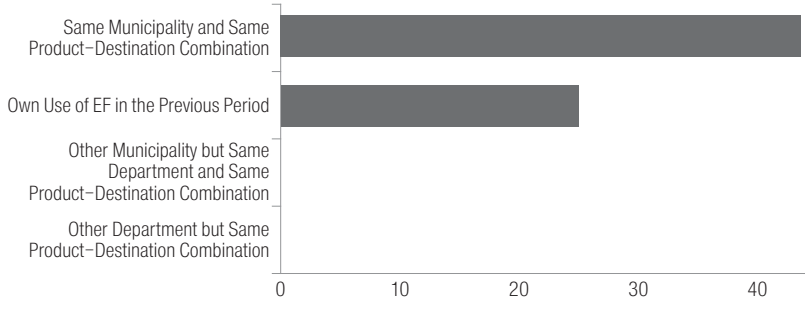
There is only one study that presents detailed quantitative evidence on the *Exporta Fácil* program for another country in the region.[32] The

[30] In addition, while regular foreign sales from firms that previously used *Exporta Fácil* do not appear to grow faster than their counterparts that did not resort to this program in the past, there is some indication that firm-product-destination exports with *Exporta Fácil* antecedents have higher growth rates than those lacking this antecedent.

[31] This is investigated by regressing a binary indicator of regular exports at the firm-product-destination level in a given year on a binary indicator that takes the value of one if there are other firms–in the same municipality, in other municipalities in the same department, and in other departments–that used *Exporta Fácil* to export the same product to the same destination the previous year and zero otherwise, along with a binary indicator that takes the value of one if the firm used *Exporta Fácil* to export the same product to the same destination the previous year and zero otherwise and firm-product-destination, firm-year, and product-destination-year fixed effects.

[32] See Caron and Ansón (2008).

Figure 4.15 ■ Peru: Spillovers from *Exporta Fácil*, 2006–2014



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* - SUNAT), national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* - PROMPERU), and public postal service (*Servicios Postales del Perú* - SERPOST). Estimates presented in this figure are reported in Table 13 in Carballo, Schaur, and Volpe Martincus (2016b).
Note: The figure shows the estimated effect (in percentage points) of own-usage of Exporta Fácil (EF) in the previous period, usage of Exporta Fácil by other firms located in the same municipality to export the same product to the same destination in the previous period, usage of Exporta Fácil by other firms located in the other municipalities within the same department to export the same product to the same destination the previous period, usage of Exporta Fácil by other firms located in other departments to export the same product to the same destination in the previous period, on the probability to start exporting the product to the destination in question through the regular channel relative to the usage of Exporta Fácil by other firms located in other municipalities in the same or other departments to export other products or to other destinations in the previous period. Estimated impacts that are not statistically significantly different from zero are reported as zero. Sample: Air-shipped exports by small firms with less than 5,000 USD median shipments.

study shows that more than 7,000 Brazilian firms used *Exporta Fácil* between 2000 and 2006, most of them small and even micro enterprises and entirely new to exporting. Thus, in 2005, 50 percent of the *Exporta Fácil* users sold less than US$1,200 worth of products abroad and the median number of products (*objects*) shipped was two.[33] As in Peru, these values are smaller than those for other exporters, including those utilizing other simplified export schemes (i.e., *Declaração Simplificada de Exportação*). Results from an informal econometric analysis appear to suggest that these are net additional exports, as they would not have otherwise occurred.[34]

[33] On the other hand, 5 percent of the exporters accounted for almost 70 percent of the total export value channeled through *Exporta Fácil* in 2005 (i.e., approximately US$16 million). Further, these firms tend to be concentrated in municipalities with high shares of manufacturing and services (and accordingly low shares of agriculture) and in specific exporting clusters (e.g., Manaus in Amazonia).

[34] Quantitative evidence on the *Exporta Fácil* programs has been relatively scarce for other countries. According to data provided by national authorities, the value exported through *Exporta Fácil* increased from almost US$100,000 to more than US$760,000 between

4.6 Summary and Conclusions

Intermediaries spread high fixed costs of exporting over multiple firms and exports to realize economies of scope and allow small firms to penetrate international markets. Programs such as *Exporta Fácil* streamline export procedures and allow post offices to take over some of the intermediation services. These services are especially relevant for firms selling specialty products on a small scale.

The results of the analysis presented in this chapter indicate that *Exporta Fácil* supported the expansion of regional small-value exports, primarily by allowing new firms to enter into foreign markets. These firms started to export under *Exporta Fácil* with lower values and could benefit from venturing abroad sooner.

The results also reveal that *Exporta Fácil* made it possible for firms to test demand by shipping small quantities at lows costs via post offices, thus helping them enter new destination markets. In addition, there is evidence of dynamic effects. Firms that began as postal exporters sold more when they became regular exporters, tended to be more stable, and diversified their destinations. Furthermore, there seems to be local external effects: non-*Exporta Fácil* users appear to have taken advantage from the export knowledge generated by *Exporta Fácil* users located in the same area and started new regular exports.

In order to enable larger gains from trade, these programs should be extended to imports (as Brazil and Peru have already done) and properly coordinated across countries in terms of operational principles and eligibility criteria related to shipment values and weights. A concrete example is illustrative in this regard. As mentioned above, usage of *Exporta Fácil* in Peru requires that the value of the shipment does not exceed US$5,000. If this were an actual binding constraint, a significant mass of the distribution of postal export shipments would be expected to be concentrated at this value. However, this is not the case (Figure 4.16).

Such distribution is clearly skewed toward values below US$2,000, which is the threshold that many countries set for simplified administrative

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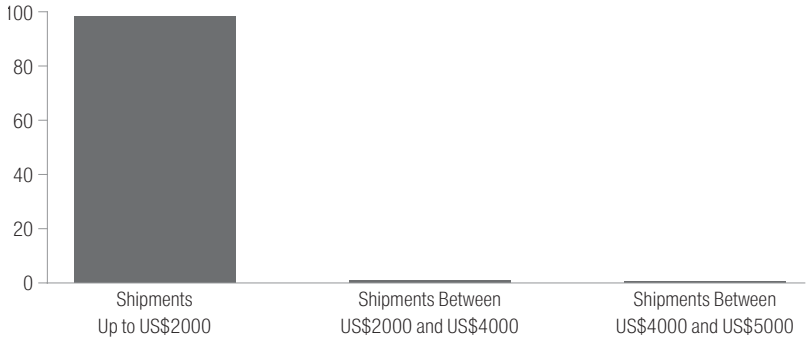
2010 and 2014 in Colombia and from roughly US$50,000 to approximately US$1.9 million between 2011 and 2014 in Ecuador. The average number of firms using the program in Ecuador between 2011 and 2014 was 138 (200 in 2014).

Figure 4.16 ■ Peru: Distribution of *Exporta Fácil* Shipments Across Value Ranges, 2014



Source: Author's calculations based on data from Peru's national tax agency (*Superintendencia Nacional de Administración Tributaria* - SUNAT), national export promotion agency (*Comisión de Promoción del Perú para la Exportación y el Turismo* – PROMPERU), and public postal service (*Servicios Postales del Perú* - SERPOST).
Note: The figure shows the percentage share of shipments whose values fall within the three specified ranges (US$1–US$2000, US$2001–US$4,000, and US$4,001–US$5,000) in the total number of shipments channeled through *Exporta Fácil* in 2014.

treatment of import shipments. As such, these shipments benefit from streamlined procedures on both sides of the border.[35]

[35] Small-value imports are also exempted from standard trade policy measures such as tariffs (i.e., de minimis regime). In Latin America and the Caribbean, the thresholds below which this holds, when applied, range from US$25 n Argentina, US$30 in Chile, and US$50 in Brazil to US$300 in Mexico, US$400 in Ecuador, and US$500 in Honduras (under certain conditions). In the United States, this threshold has been set at US$800 (Global Express Association 2016).

>> Beyond Customs: From Multiple Border Agencies to Virtual Single Windows

5

5.1 The Border Labyrinth and Crossing Costs

"Today, traders must submit the same information to multiple agencies, multiple times through processes that are largely paper-based and manual." This was the assessment of the U.S. Department of Homeland Security in its introduction to an Executive Order on "Streamlining the Export/Import Process for America's Businesses" signed on February 19, 2014. It explicitly recognizes the reality in which firms trading across borders typically operate around the world, both in developing and even in developed countries. These firms may have to complete as many as 40 documents involving 200 data fields, some 60 to 70 percent of which have to be re-keyed more than once.[1] For example, until some years ago in Costa Rica, the 16 main intervening agencies had 44 different procedures. In the United Kingdom there are more than 60 different trade procedures targeting goods and the vehicles that move them or their operators, and concerning revenue collection and fiscal protection, public safety and security, environment and health, consumer protection, and trade policy.[2]

Further, most of these procedures are specific to (groups of) products. The case of meat imports into the United Kingdom is elucidative in that respect. Five categories of procedures apply to these imports, including

[1] See APEC-BAC (1996) and Sathasivam (2009).

[2] See Grainger (2007).

license procedures administered by the Rural Payment Agency, procedures for booking and collecting cargo from shipping lines, procedures to clear goods through port health at the port of entry's border inspection posts, and procedures to clear goods through customs. Importantly, compliance with these procedures requires 26 transactional steps related to import licensing, shipping lines, the port, port health, and customs. These transactional steps involve using at least three different electronic systems (i.e., the port community systems at the UK's main ports, the port's vehicle booking systems, and the European veterinary entry system known as TRACES) and potentially several additional information and communication systems and filling out from four to six paper documents.[3] Problems associated with the need to maintain different systems to meet such multimodal requirements are further aggravated in developing countries, where there is little inter-agency coordination.[4] This adds costs to all parties and may negatively affect the accuracy of the data and the timeliness of trade.

In short, in the absence of efficient processing mechanisms and appropriate coordination, procedures associated with trade regulations can be repetitive and redundant, and therefore create significant trade costs, especially when paper-based. The costs of complying with these trade-related regulatory requirements have been estimated to be 3.5 to 7 percent of the value of goods and can even reach 10 to 15 percent of this value if there are typing and other errors.[5]

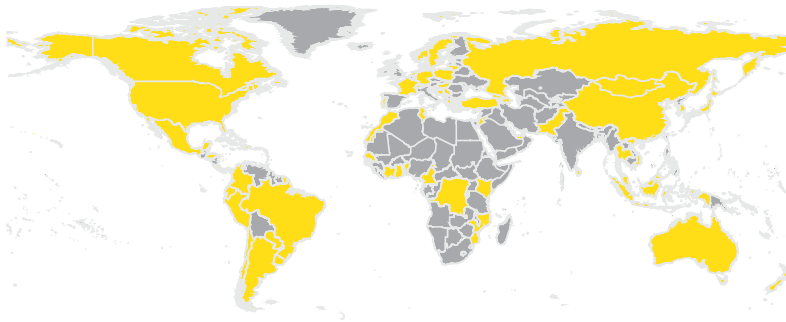
5.2 The Vanishing Border Labyrinth: Virtual Trade Single Windows

5.2.1 Electronic Trade Single Windows

Trade single windows are flagship initiatives that reduce the hurdles described above by streamlining the administrative process related to international trade transactions. They allow parties involved in trade and transport to lodge standardized information with a single entry point to fulfill all import, export, and transit-related regulatory requirements.[6]

[3] See Grainger (2013).
[4] See UNESCWA (2011).
[5] See van Stijn, Phuaphanthong, Kerotho, Pikart, Hofman, and Tan (2011).
[6] See UNECE (2005). Single windows are used in many banking and e-government processes (UNESCWA 2011).

Figure 5.1 ■ World: Countries with Active Trade Single Window Schemes, 2014/2015



Source: Prepared by the author based on UNESCWA (2011), World Bank (2014a), and IDB-OECD (2015).
Note: Countries in yellow shading have active trade single window schemes.

Information technology, ever expanding the ability to share information and increasing computing speeds at lower costs, along with interoperability enabling methods (e.g., service-oriented architectures through which disparate systems can "talk" to each other), have made it possible to develop and implement electronic trade single windows.[7] Instead of filling out and physically moving paper-based documents consecutively, these single windows allow online applications, digital document exchange among agencies dealing with trade regulations, and issuance of trade-related permits and certificates.[8]

As shown in Figure 5.1, more than 70 countries around the world have implemented single window schemes.[9]

[7] See UNESCWA (2011). A well-known nontrade example of how information technology has facilitated massive electronic data exchanges is the messaging system of the Society for Worldwide Interbank Financial Telecommunications (SWIFT), established in the 1970s (Tsen 2011).

[8] The initial version of Singapore's Single Window TradeNet developed at the end of the 1980s used a proprietary message exchange technology that consisted of 1.2 million lines of assembly code. See King and Konsynski (1990) and Teo, Tan, and Wei (1997) on the implications of the introduction of electronic data interchange in Singapore. Advances in secured messaging technologies have broadened the alternatives to handle, process, and exchange increasingly large amounts of messages, and have substantially reduced the time and costs needed to design and implement a single window (Tsen 2011).

[9] Ulloa and Robert (2015) examine the operative aspects of the trade single windows and the factors that are critical for them to function well.

These schemes have varying degrees of comprehensiveness ranging from partial arrangements that only cover a subset of the universe of trade procedures with or without automatic transfer of the respective approvals to the customs declaration system, to fully integrated arrangements also encompassing all logistics operations (e.g., at maritime ports, airports, and international road borders).[10] Overall, most active trade single windows are limited in scope to trade formalities.[11]

Table 5.1 describes the state of these arrangements for selected Latin American and Caribbean countries. The total number of border agencies ranges from nine to 40, with the median being 19.5. The share of these agencies that participate in the respective national single windows ranges from 30 percent in Argentina to 100 percent in Costa Rica, Colombia, and El Salvador. As for procedures, percentage shares covered by these schemes are as low as 5 percent in Argentina and as high as 100 percent in Costa Rica.[12] In the latter country, all trade transactions involving permits are now accordingly processed through the single window. Single window systems have some form of integration with customs systems or at least allow for some interchange of electronic messages and workflow (i.e., Colombia, Peru, and Trinidad and Tobago).

These varying shares of participating agencies and covered procedures highlight the fact that implementing an electronic single window is a far-reaching undertaking.[13] More precisely, due to the large number of (usually unconnected and uncoordinated) stakeholders and the technical complexities involved, countries typically follow an incremental approach such that groups of border agencies and their respective procedures are sequentially incorporated into the arrangement.[14] In general, the order in which these agencies join and their procedures are accordingly added

[10] See UNESCWA (2011) and World Bank (2014a).

[11] See Choi (2011). It is also worth mentioning that some of the regulatory activities may take place while goods are under customs control, while others are independent of these controls.

[12] These shares could not be computed for several countries because they did not report the total number of trade-related procedures.

[13] A single window can be viewed as a complex piece of machinery with many moving parts (van Stijn, Phuaphanthong, Kerotho, Pikart, Hofman, and Tan 2011).

[14] See Tsen (2011), van Stijn, Phuaphanthong, Kerotho, Pikart, Hofman, and Tan (2011) and UNESCAP and UNECE (2013). The implementation of the Royal Thai Customs' paperless system is a clear example in that respect. It took approximately three years to introduce the information technology parts and three additional years for this system to be fully operational at all major seaports, airports, and land border crossings (UNESCAP and UNECE 2013).

Table 5.1 ■ Selected Latin American and Caribbean Countries: Status of Trade Single Window Schemes, 2015

Country	Number of Agencies	Number of Agencies with the Single Window	Percentage Share of Agencies with the Single Window	Number of Procedures	Number of Procedures with the Single Window	Percentage Share of Procedures with the Single Window	Percentage Share of Trade Transactions Subject to Permit Processed through the Single Window	Integration of Customs-Single Windows
Argentina	40	12	30.0	245	12	4.9	n.a.	Yes
Brazil	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Yes
Chile	21	11	52.4	50	43	86.0	70.0	Yes
Colombia	21	21	n.a.	n.a.	n.a.	n.a.	n.a.	No
Costa Rica	16	16	100.0	105	105	100.0	100.0	Yes
Ecuador	24	20	83.3	142	138	97.2	97.0	Yes
El Salvador	9	9	100.0	54	42	77.8	X: 100.0/M: 90.0	X: Yes/M: Partial
Honduras	11	9	81.8	n.a.	8	n.a.	70.0	X: Yes
Mexico	n.a.	10	n.a.	n.a.	n.a.	n.a.	87.0	Yes
Paraguay	15	13	86.7	46	44	95.7	67.0	Yes
Peru	n.a.	21	n.a.	n.a.	260	n.a.	21.0	No
Trinidad and Tobago	18	16	88.9	n.a.	38	n.a.	70.0	No
Uruguay	24	9	37.5	100	36	36.0	10.0	Yes

Source: Prepared by the author based on information directly provided by countries' agencies and compiled in IDB-OECD (2015) and information provided by IDB specialists in the field.
Note: The table reports the number of agencies, the number and percentage share of agencies participating in the single window, the number of procedures, the number and percentage share of procedures covered by the single window, the percentage share of trade transactions (requiring permits, certificates, or authorizations) processed through the single window, and whether the single window system is integrated with the customs system. According to the most recent institutional mappings, the total number of relevant border agencies in Argentina is 24 and in Chile 19. In Chile the number (percentage share) of agencies participating in the single window is 8 (42.1 percent). In the cases of Peru and Uruguay, percentage shares reported in the next-to-last column correspond to those on total trade transactions. n.a.: not available.

is determined based on their organizational readiness to introduce the technological innovation.[15] As shall be seen below, this stepwise implementation of single window is helpful to identify their impact on trade.

5.2.2 Electronic Single Windows and Exports

Upgrading technology from a paper-based to an electronic single window does not change the information demanded by regulators, but rather how this information is submitted and processed. This likely results in lower administrative processing costs, as firms can manage trade-related documentation in a more efficient way and thus minimize clerical efforts. More importantly, electronic single windows are associated with an increase in the speed, timeliness, and accuracy of information submission and processing, and a reduction in response times.[16] Firms can interact with a single virtual agency instead of having to pay physical visits to obtain paper forms, fill them out, and present them at the various regulatory agencies involved. Further, submitted data can be reused multiple times, errors from re-keying identical data are eliminated, and data consistency is enhanced. Moreover, systems generally allow better tracking of the progress toward completing the procedures and more predictable decisions.[17]

By reducing administrative barriers and, specifically, lead times, the electronic single window can make it possible to increase shipping frequency and thereby exports, particularly for products with high demand volatility that require flexibility in their supply.[18] Further, if buyers have preferences regarding the arrival dates of their orders, higher shipping frequency can allow firms to better match these specific delivery dates, which can also support expansion

[15] Alternatively, border agencies responsible for regulations applied to products that account for large shares of trade values and transactions could be prioritized (van Stijn, Phuaphanthong, Kerotho, Pikart, Hofman, and Tan 2011).

[16] Single windows can result in a significant reduction in the time spent on preparing trade documents. Existing evidence indicates that the number of days required to prepare these documents is 40 percent lower (8 versus 14 days) in countries with trade single window schemes (World Bank 2014b).

[17] See UNECE (2003), UNECE (2005), UNESCWA (2011), and van Stijn, Phuaphanthong, Kerotho, Pikart, Hofman, and Tan (2011).

[18] Short lead times are valuable. Focusing on textiles trade between the Caribbean and the United States, Evans and Harrigan (2005) show both theoretically and empirically that firms are willing to pay a wage premium in order to locate close to the destination market because lead times are short there and this gives them the flexibility to respond to demand shocks and supply the market just-in-time when demand is realized.

of their foreign sales.[19] Thus, introduction of the electronic single window can be expected to result in increased numbers of shipments and exports.

As for unit values, if the costs associated with compliance with border regulations decrease and firms pass these cost savings to consumers, then factory gate unit values will decrease. On the other hand, if the reduction in lead times made possible by the new arrangement allows for more timely delivery close to the buyers' preferred date, then factory gate unit values will remain unchanged or even increase if the implied quality upgrade affects the exporters' optimal pricing rule. Hence, the effect on unit values depends on which of these two forces prevail and is a priori undetermined.[20]

The remainder of this chapter explores these trade effects of the electronic single window using the Costa Rican Foreign Trade Single Window (*Ventanilla Única de Comercio Exterior* – VUCE) as the main case study.

5.3 Case Study: The Costa Rican Electronic Trade Single Window

5.3.1 Data

The Costa Rican customs agency (*Dirección General de Aduanas* – DGA) and the Costa Rican national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER) kindly provided three main databases to assess the impact of the Costa Rican VUCE on exports.

The first database includes export data from 2007 to 2013. Each record includes a firm's identification number, the product code (10-digit HS), the destination country, the foreign buyer, the export value in U.S.

[19] Hornok and Koren (2015b) argue that consumers have a preferred arrival date for their shipments. As a consequence, consumers value more those shipments that arrive closer to such date than their counterparts that deviate from it. The authors demonstrate that a decrease in per-shipment costs due to a reduction of administrative border barriers leads firms to increase their shipping frequency. The reason is that with a lower per-shipment cost, firms make more shipments to reach consumers closer to the time of preferred arrival. This increases exports.

[20] On one hand, simple inventory models highlight that a reduction in administrative barriers and the resulting higher shipping frequency lowers storage costs and accordingly prices. Assuming that consumer prices increase in the time between arrival and purchase due to storage costs, and that demand arrives continuously, Kropf and Sauré (2014) establish that more frequent shipments lead to lower prices. On the other hand, combining ideas from Harrigan and Evans (2005) and Hornok and Koren (2015b), if lead times are a constraint to get products to the market fast, then a reduction in these lead times and the ability to flexibly deliver when buyers most prefer these products is an upgrade in quality that can induce an increase in prices.

dollars, and the quantity (weight) in kilograms. For 2010–2013, transaction-level data are also available. These data also inform the port, airport, or land border through which the shipment exits Costa Rica (hereafter, generically "port"), the transport mode, the date when customs processing of the shipment was requested ("channel request"), and the date when the shipment was authorized to leave customs ("release date"), i.e., the customs clearance times.[21] This database also reports the month when the new customs information system started to operate in each port.

The second database reports, for each line of the tariff schedule and each year from 2007–2013, the permits that firms had to obtain in order to export the respective products. The third database covers all export transactions processed through the electronic trade single window since its establishment until 2013. It shares several fields with the customs database, which makes it possible to merge them. The electronic single window database therefore allows the specific shipments that were actually processed under this new scheme and which were not to be identified. The database also includes information on the date when each permit (and specific products) could start to be processed with that single window in each port.

5.3.2 Trade Regulations in Costa Rica

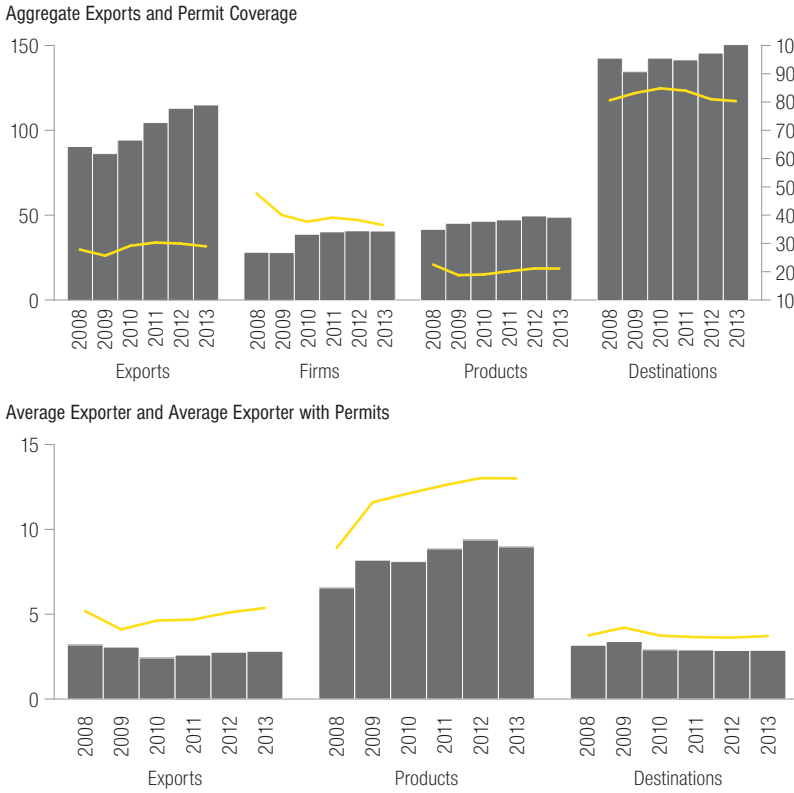
Thousands of specific products, uniquely codified by the Harmonized System (HS) Classification, are subject to controls in most countries around the world.[22] Costa Rica is no exception in this regard. Export of various products requires prior permits, authorizations, or certifications (hereafter referred to generically as "permits"). More precisely, in addition to being registered as exporters with PROCOMER, firms intending to export these products have to obtain permits from the relevant agencies for their respective shipments to be releasable by customs. These permits, which are known as Technical Notes (*Notas Técnicas* – NT), are essentially nontariff measures adopted by the country primarily to protect public health and safety as well as the environment, and to address information problems.

The upper panel of Figure 5.2 shows the relative importance of permits in Costa Rican exports. In particular, this panel reports the country's total exports and key aggregate extensive margin indicators (left y

[21] See Chapter 2 and Volpe Martincus, Carballo, and Graziano (2015, 2016).
[22] See UNESCWA (2011).

axis) along with the percentage share accounted for by those requiring permits from 2008 to 2013 (right y axis). Around 4,000 exporters sold almost 5,000 products to 151 countries for a total of US$11.5 billion in 2013. Exports under permits account for approximately 30 percent of total Costa Rican exports, 37 percent of the total number of exporters, 21 percent of the total number of exported products, and 80 percent of the total number of reached destinations.

Figure 5.2 ■ Costa Rica: Aggregate Export Indicators, Coverage of Export Permits, Average Exporter, and Average Exporter Requiring Permits, 2008–2013



Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduanas* – DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER).
Note: The upper panel reports aggregate export indicators (gray bars, left y axis) along with the respective percentage share subject to permits (yellow lines, right y axis). The lower panel presents export outcomes for the overall average exporter (gray bars) along with those for the average exporter requiring permits (yellow line). In the upper panel, export values are expressed in increments of US$100 million, the number of firms in hundreds, and the number of products in hundreds. In the lower panel, export values are expressed in millions of U.S. dollars.

The lower panel of Figure 5.2 characterizes both the overall average Costa Rican exporter and the average exporter whose exports are subject to permits in terms of its total foreign sales, number of products, and number of destinations. On average, in 2013 exporting firms sold nine products to three countries for approximately US$2.8 million. The average exporter requiring permits is larger along these dimensions. This firm exports 13 products to 3.7 destinations for US$5.4 million.

Table 5.2 focuses on the specific regulations and lists the individual permits required in Costa Rica over 2008–2013, along with information on the agency responsible for their processing, the year when the requirement was established, and the products covered according to the HS 2-digit classification. Figure 5.3 reports the joint share of these products in the country's total exports in 2013. Technical Notes 265 and 266 are the phytosanitary and sanitary certificates for export and related procedures and jointly account for a relatively large share of Costa Rican aggregate foreign sales. These export permits are issued by national authorities in accordance with international practices and standards. Take, for instance, the case of products whose trade requires a sanitary certificate. In this case, for Costa Rican exports of these products to be cleared in the

Table 5.2 ■ Costa Rica: Year of Introduction, Responsible Agency, and Product Coverage of Individual Technical Notes

Technical Note	Description	Year	Agency	HS 2-Digit Product
36	Species of Wildlife Flora and Fauna	2003	MINAE	01, 03, 05, 06
38	Ozone	2003	MINAE	29, 38, 84
45	Seeds	2007	ONS	06, 10, 12
50*	Food De-warehouse	2006	MS	09, 11, 17, 18, 20, 21
51	Drugs and Narcotics	2003	MS	29
52	Chemical Weapons	2003	MS	29
57*	Medicines, Cosmetics, and Medical Equipment	2003	MS	30, 33
60	Explosives	2006	MSP	28, 32, 36

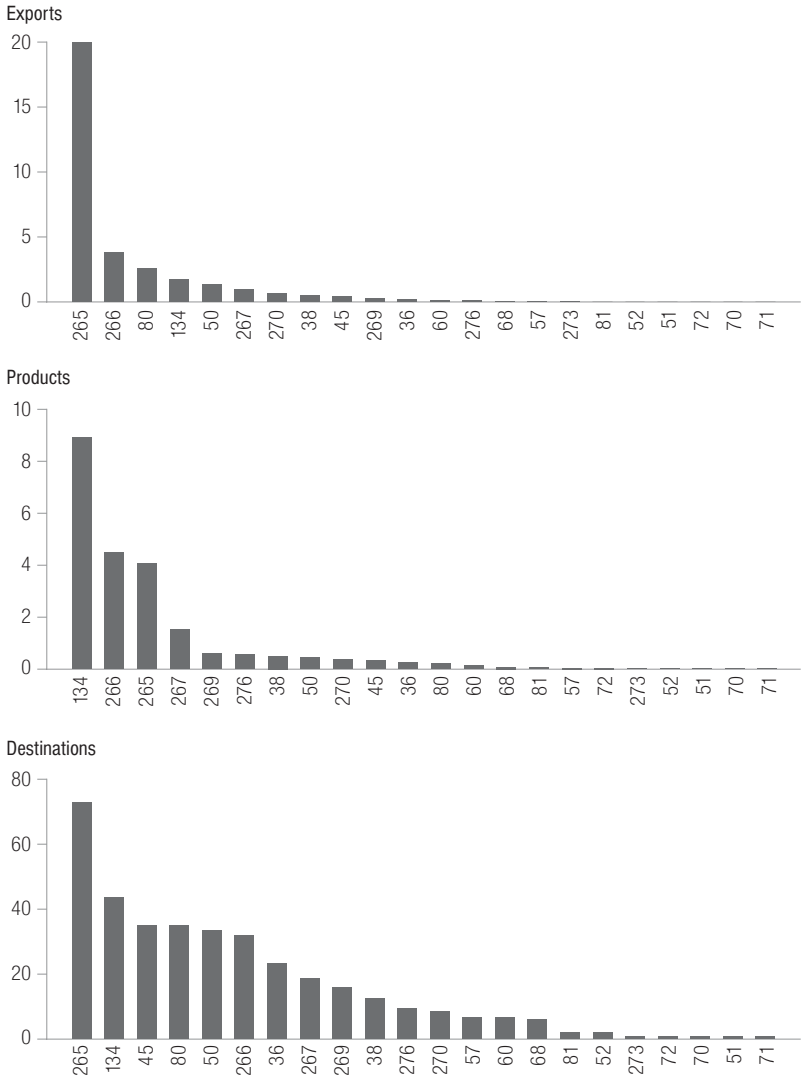
(continued)

Table 5.2 ■ Costa Rica: Year of Introduction, Responsible Agency, and Product Coverage of Individual Technical Notes (*continued*)

Technical Note	Description	Year	Agency	HS 2-Digit Product
68	Fish, Mollusk, and Crustacean	2003	INCOPESCA	03
70	Weapons	2005	MSP	93
71	Ammunitions	2005	MSP	93
72	Ammunitions	2002	MSP	93
80	Coffee	2005	ICAFE	09
81*	Endangered Species of Wild Fauna and Flora	2004	MINAE	01, 03, 44
134	Textile and Apparel Products	2007	CCT	39, 42, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 87, 88, 94, 95, 96
265	Vegetables	2007	MAG	06, 07, 08, 09, 10, 12, 14, 18, 23, 24, 44
266	Livestock	1950	MAG	01, 02, 03, 04, 05, 15, 16, 19, 21, 22, 23, 31, 38, 41
267	Chemical and Biological Substances and Equipment	2005	MAG	15, 25, 27, 28, 29, 31, 34, 38, 84
269	Hazardous Wastes	2008	MS	72, 78, 84, 85
270	Precursors and Chemical Substances	2006	MS	22, 27, 28, 29, 38
273*	Original Archeological Pieces	2008	CPN	97
276	Veterinary Drugs	2009	MAG	29, 30, 33, 38, 49

Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduanas* - DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* - PROCOMER).
Note: The table reports the year of introduction, the responsible border agency, and the product coverage in terms of the HS 2-digit Chapter of each individual technical note. The column "HS 2-Digit Products" reports the HS chapters affected by each technical note. This does not mean that all HS 10-digit products of a given HS chapter are subject to permits.
MINAE: *Ministerio de Ambiente y Energías* – Ministry of Environment and Energy (several subagencies: SNAC, OTO, DSE, GGCA); ONS: *Oficina Nacional de Semillas* – National Seeds Office; MS: *Ministerio de Salud* – Ministry of Health (several subagencies: ANAQ, DAC); MSP: *Ministerio de Seguridad Pública* – Ministry of Public Security; INCOPESCA: *Instituto Costarricense de Pesca y Acuicultura* – Costa Rican Institute for Fishing and Aquaculture; ICAFE: *Instituto del Café de Costa Rica* – Costa Rican Coffee Institute; ANEIT: *Asociación Nacional de Exportadores de la Industria Textil* – National Association of Textile Industry Exporters; MAG: *Ministerio de Agricultura y Ganadería* – Ministry of Agriculture and Livestock (several subagencies: SFE, SENASA); MN-DPPC: *Museo Nacional – Departamento de Protección del Patrimonio Cultural* – National Museum – Department of Cultural Heritage Protection.

Figure 5.3 ■ Costa Rica: Percentage Share of Individual Technical Notes in Total Exports, Products, and Destinations, 2013



Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduanas* - DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* - PROCOMER).
Note: The figure reports the percentage share of exports, products, and destinations subject to each technical note in total Costa Rican exports, number of products, and number of destinations, respectively. Percentage shares in exports are for 2013 except for Technical Notes 50, 57, 273, and 81, for which case data correspond to the last year in which products covered jointly registered positive exports.

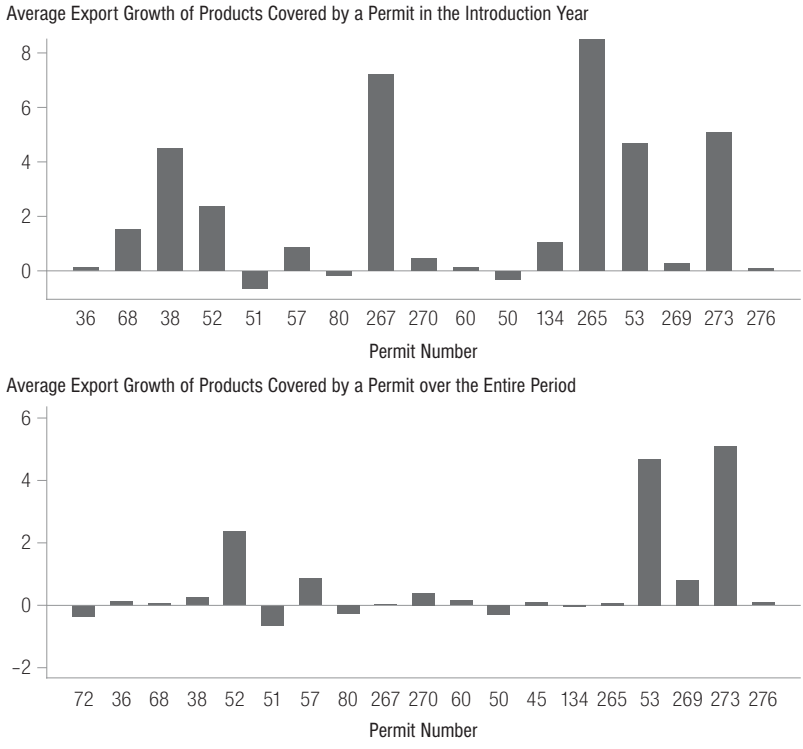
destination country, a valid official sanitary certificate from the relevant Costa Rican agency must be submitted along with the respective import declaration. The same holds vice versa: imports of these products can only enter Costa Rica if accompanied by the sanitary certificate provided by the counterpart in the origin country.

Technical Notes 80 and 134, which apply to exports of coffee and textile products, respectively, are the third- and fourth-most important regulations in terms of the percentage share of Costa Rica's total exports for which they account. These regulations have different rationales. While Technical Note 134 has been primarily used to manage the textile quotas established in the framework of the multilateral and preferential trade agreements signed by Costa Rica (e.g., the free trade agreement with Mexico), Technical Note 80 aims to ensure that the coffee sold abroad meets certain quality standards set by the Costa Rican Coffee Institute (*Instituto del Café)*, a public-private organization, and thereby protect the country's reputation as a provider. Most other permits involve products that are relatively insignificant in terms of the share of exports for which they are responsible and legally derive from international agreements or norms.[23] From this point of view, the streamlined procedures associated with the electronic single window can be seen as a means to reduce the nontariff barriers faced by a country's exporters.

Figure 5.4 explores what drives the timing of the introduction of these permits and specifically whether this is somehow related to trade developments. The figure presents on the x axis the permits according to their introduction date from the earliest to the latest, and on the y axis

[23] This is the case with the Technical Note 38, which is based on the Montreal Protocol on substances that deplete the ozone layer; Technical Note 51, whose product coverage reproduces the list of narcotics defined by the International Narcotics Control Board; Technical Note 52, which applies to those chemical substances that should be controlled according to the United Nations Convention on the Prohibition, Development, Production, Stockpiling, and Use of Chemical Weapons and on their Destruction; Technical Notes 60, 71, and 72, whose legal basis is the Inter-American Convention against Ammunition, Explosives, and other Related Material and the International Convention for Suppression of Terrorist Bombings; Technical Note 81, which is associated with the Convention on International Trade in Endangered Species of Wild Fauna and Flora; and Technical Note 269, which implements the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

Figure 5.4 ■ Costa Rica: Timing of Introduction of Permits and Previous Export Growth



Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduanas* - DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* - PROCOMER).
Note: The upper panel reports the average annual growth rate of exports of products covered by each permit the first year in which it was introduced over the previous three years, whereas the lower panel presents the average annual growth rate of exports of all products covered by each permit at some point of the sample period over the three years previous to its introduction. Permits are ordered on the x axis according to their date of introduction from the earliest to the latest.

the average annual growth rate of exports of the products subject to each of these permits (either in the first year of their appearance or in at least one year during the period when they have been in place) over the three years prior to their introduction. The panels indicate that in principle there has been no systematic relationship between the timing of the permits and the growth of exports of the goods to which these permits apply. Importantly, as a consequence, there seems to be no built-in bias in this specific process that could lead to biased estimates of the trade impact of the single window.

5.3.3 The Costa Rican Electronic Single Window: Introduction, Coverage, and Average Users

In Costa Rica, in addition to the national customs agency, 16 entities issuing 20 authorizations intervene in the export process. Until the mid-1990s all these entities used different documents, which had to be presented in person in their respective different locations throughout the country's capital, San José. After being processed, these documents had to be delivered, also in person, to the corresponding customs office (Figure 5.5). As a consequence, completing the formalities of the export process rarely took less than five days and often much longer.[24]

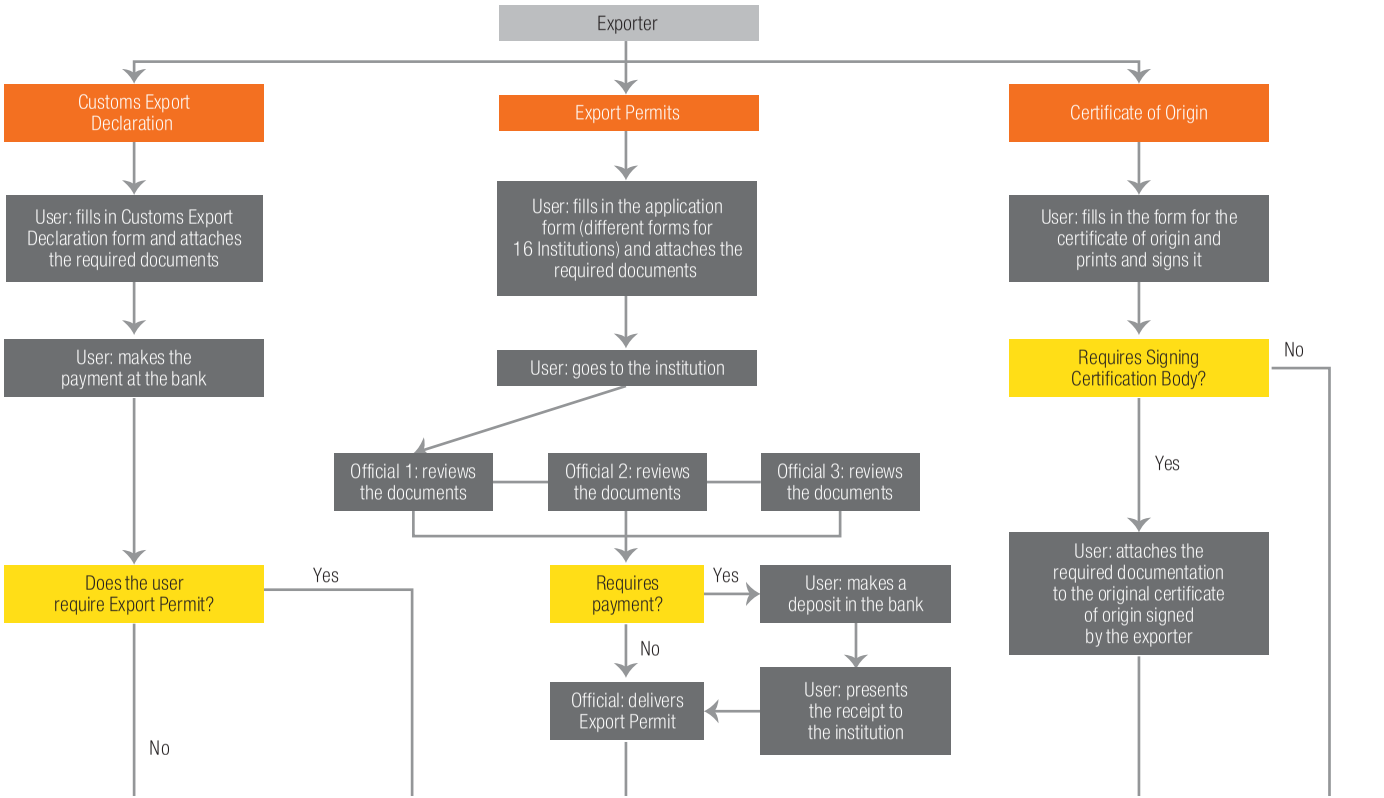
A first single window arrangement was established by Law 7638 (Article 8, Section c) passed in November 1996. The law also created the Ministry of Foreign Trade and the national trade promotion agency, *Promotora del Comercio Exterior de Costa Rica* – PROCOMER, responsible for administering the single window.

The first single window arrangement primarily consisted of harmonizing the many existing heterogeneous and overlapping forms in terms of information fields into a single and comprehensive document that gathered all data required by the intervening agencies. This single document could be presented in person at the main office of the single window in San José, where officials from two of the agencies (responsible for health and agriculture) were also located, at regional offices of the single window—where no agencies were represented—(Santamaría, Caldera, Limón, Peñas Blancas, and Paso Canoas), or at the offices of the respective agencies. Except at the main office in San José and for the authorizations handled by the agencies responsible for agriculture and health, these documents had to be physically submitted for approval to the relevant entities.

Starting in the mid-2000s, PROCOMER moved to an electronic trade single window. The aforementioned single document was then required to be filled out just once online and the system automatically distributed it among the entities that, according to the procedures, had to issue permits. This precluded the need to go to a physical office or physically submit the form to these entities. These permits were then submitted electronically to the customs systems to be added to the

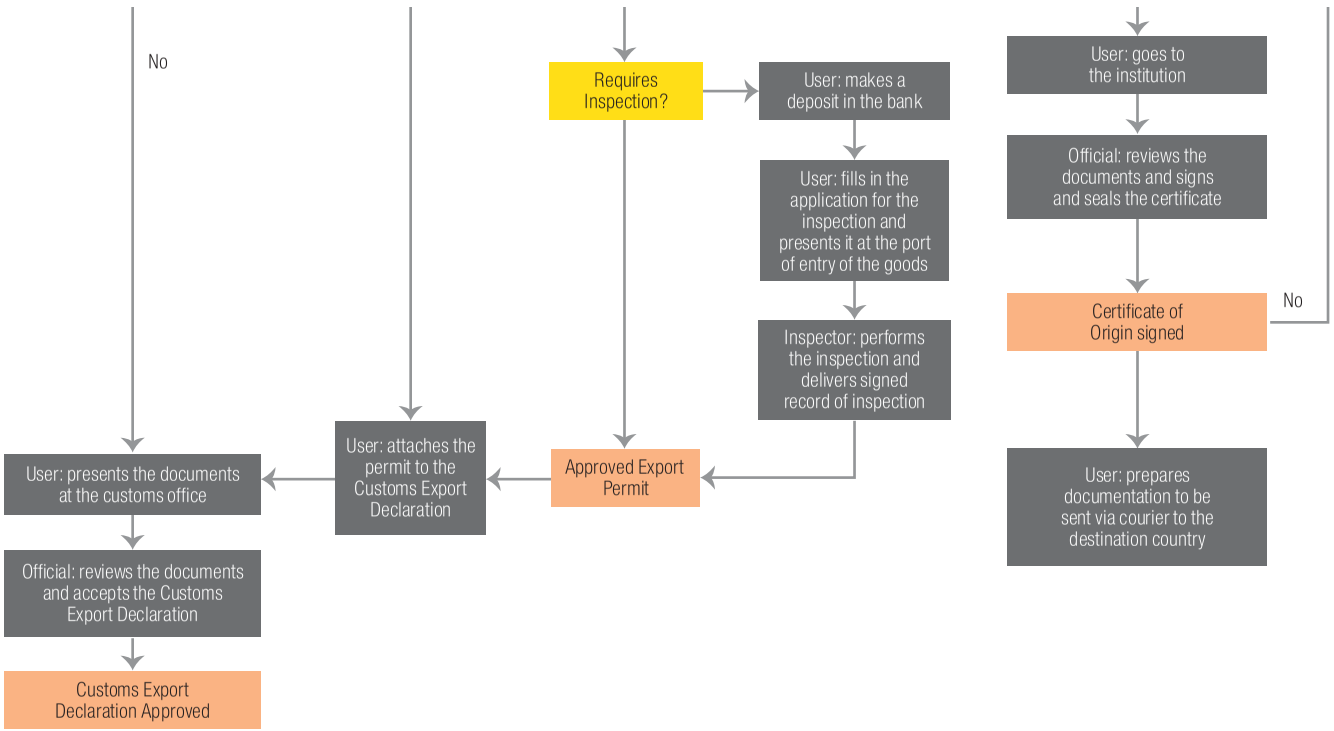
[24] See Salas (2010).

Figure 5.5 ■ Costa Rica: Administrative Processing of Export Flows Requiring Permits Prior to Introduction of the Single Window



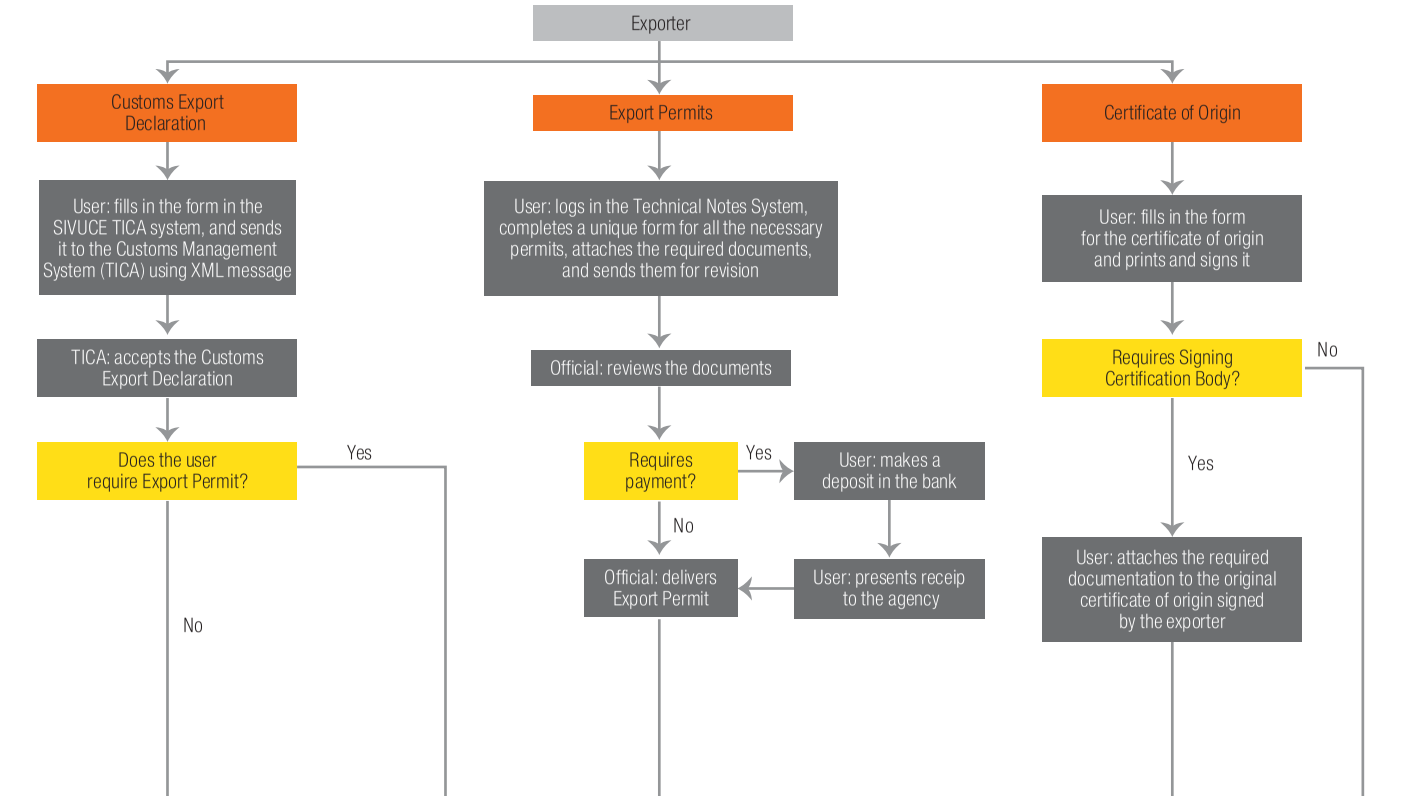
(continued)

Figure 5.5 ■ Costa Rica: Administrative Processing of Export Flows Requiring Permits Prior to Introduction of the Single Window (*continued*)



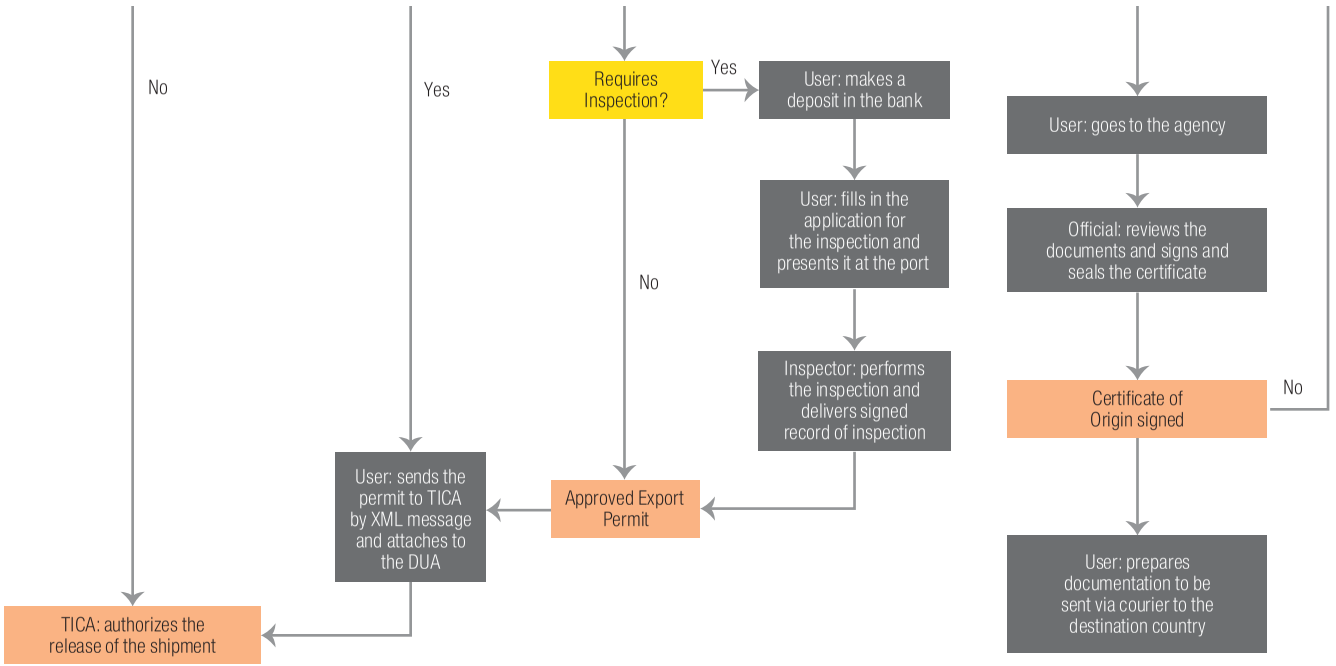
Source: The Costa Rican national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER).

Figure 5.6 ■ Costa Rica: Administrative Processing of Export Flows Requiring Permits with the Electronic Single Window



(continued)

Figure 5.6 ■ Costa Rica: Administrative Processing of Export Flows Requiring Permits with the Electronic Single Window (*continued*)



Source: The Costa Rican national trade promotion agency *(Promotora del Comercio Exterior de Costa Rica - PROCOMER).*
Note: DUA: Documento Único de Aduana (Single Customs Document); *SIVUCE: Sistema Integrado de Ventanilla Única de Comercio Exterior* (Foreign Trade Single Window Integrated System).

respective customs declaration (Figure 5.6). In short, implementation of the electronic single window implied a switch from a scheme in which shipments requiring documentation were processed manually and separately with each intervening agency—even if presented at a single entry point—to a scheme in which this documentation was processed electronically in a simultaneous manner for all agencies.

This enabled significant streamlining of the procedures and specifically for a reduction in the resources and the time that firms spent dealing with the formalities associated with trade activities. Crucially, it also shortened the response time in the handling of their authorization requests.

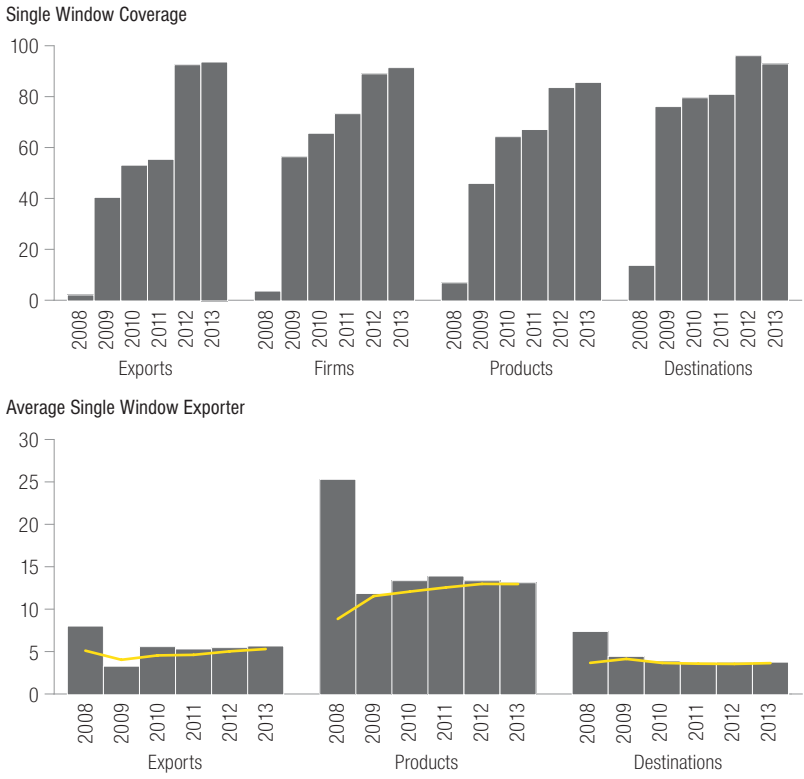
The upper panel of Figure 5.7 reports the percentage share of exports and their main margins subject to permits that was actually processed through the electronic single window over the sample period. These shares increased over time to reach 90 percent or more in 2013.[25] The lower panel of Figure 5.7 characterizes the average single window exporter, which, as expected, is very similar to the average exporter whose foreign sales are subject to permits. While the former average exporter is accordingly also larger than the exporting firms that do not have to use the electronic single window, these differences are then driven by the regulations rather by the actual use of this scheme.

Figure 5.7 suggests that the implementation of the electronic single window in Costa Rica followed the typical gradual approach observed in other countries. As shown in Figure 5.8 for the two main Technical Notes in terms of the percentage share of total exports for which they account, such a stepwise introduction has two main origins. First, procedures (Technical Notes) were sequentially incorporated into the scheme, with the sequence being determined by the technological readiness of the respective agencies and the strength of the preexisting working relationship between PROCOMER as the single window's coordinating unit and these agencies. As pointed out above, this generated variation in the use of the electronic single window across (groups of) products.

Second, the new customs information system (Information Technology for Customs Control Scheme – TICA) was phased in to process export

[25] Trade regulations may change within a year. This explains, at least partially, why these shares were not 100 percent in 2013.

Figure 5.7 ■ Costa Rica: Percentage Share of Trade Subject to Permits Processed through the Electronic Single Window, and Average Exporter Using the Electronic Single Window Relative to the Average Exporter Requiring Permits, 2008–2013

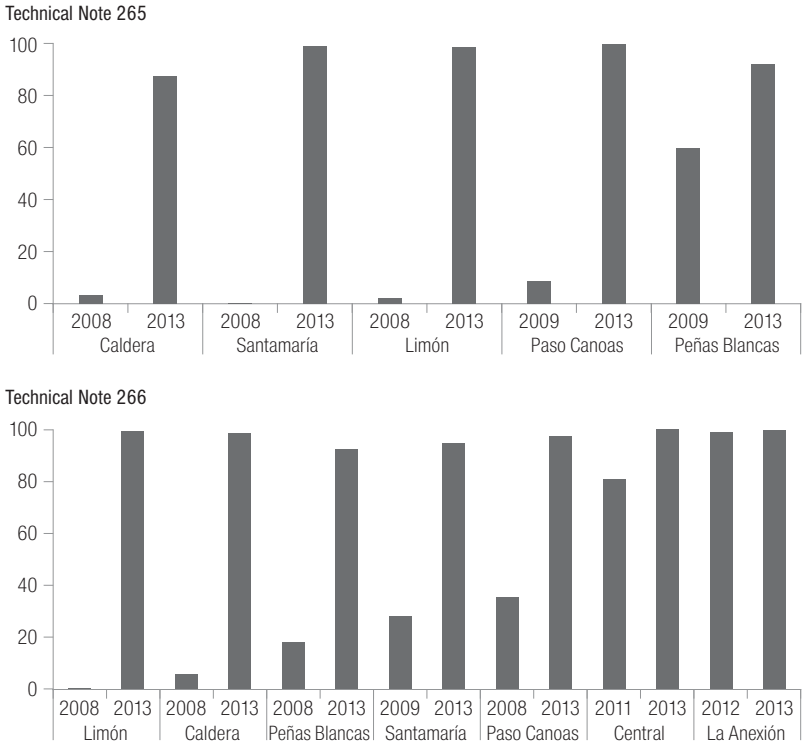


Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduanas* – DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER).
Note: The upper panel reports the percentage share of exports subject to permits processed though the single window, whereas the lower panel presents export outcomes for the average exporter using the single window (dark gray bars) along with those for the average exporter requiring permits (yellow lines). In the lower panel export values are expressed in millions of U.S. dollars.

shipments throughout the ports in the country.[26] TICA centralizes all the formalities and information necessary for customs control of merchandise trade. Once this system was in place, Article 107 of General Law of Customs 7557, which requires all agencies to submit their permits electronically to

[26] Implementation of TICA was also sequenced across trade regimes. Thus, TICA was gradually put in place for transactions under special trade regimes such as those for firms in free trade zones after it was completely operative for regular exports.

Figure 5.8 ■ Costa Rica: Two Main Technical Notes in Terms of Percentage Share of Total Exports and Their Incorporation into the Electronic Single Window, 2008–2013

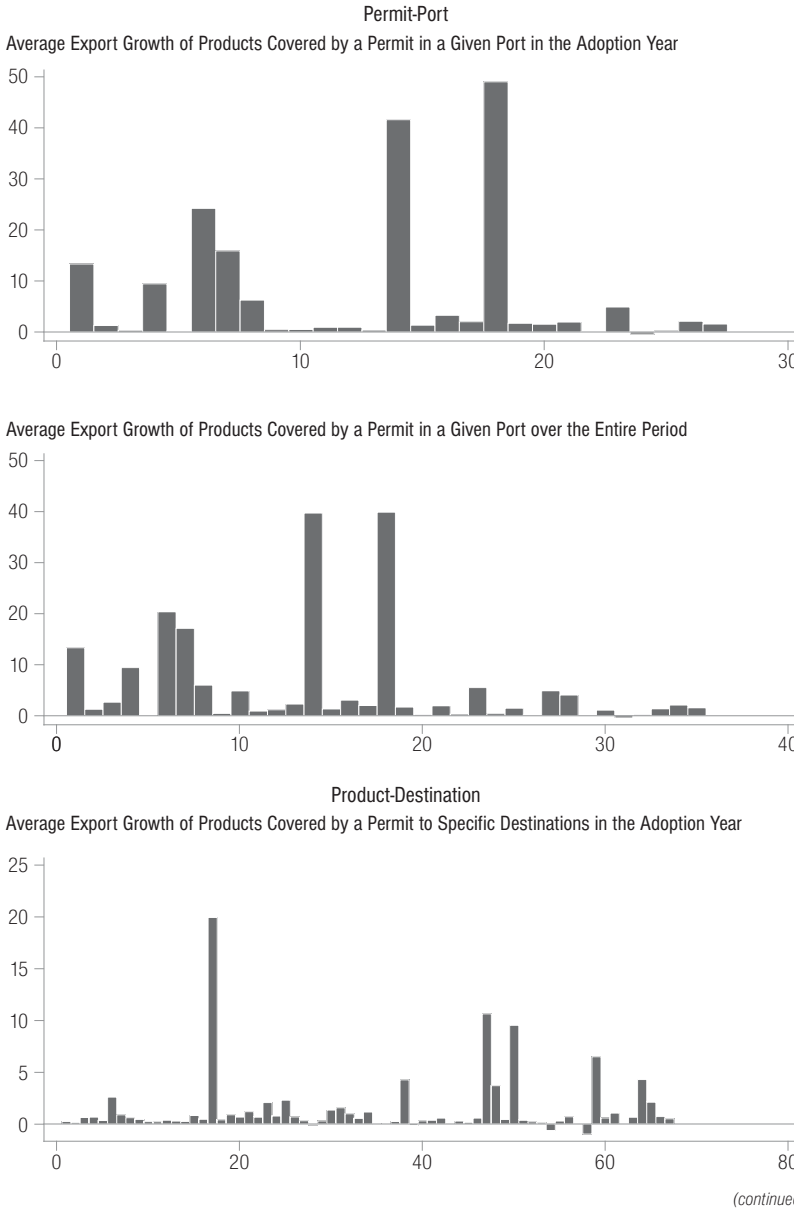


Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduanas* – DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER).
Note: The figure reports the percentage share of exports requiring Technical Note 265 and Technical Note 266 accounted for by the electronic single window upon their introduction and the most recent available year. Table 5.2 lists the HS 2-digit products covered by these Technical Notes.

customs, became enforceable and actually mandatory. In this regard, it is worth noting that exports of given products to different destinations tend to be shipped from different ports (e.g., cocoa powder and maize starch are shipped through Peñas Blancas when the destination is Nicaragua and through Puerto Limón when the destination is the United States).

Figure 5.9 follows the same logic as Figure 5.4. It reveals that permits affecting groups of products in specific ports, and even groups of products themselves in specific destinations (to allow for possible differential sectoral treatment within these combinations) with fast-growing

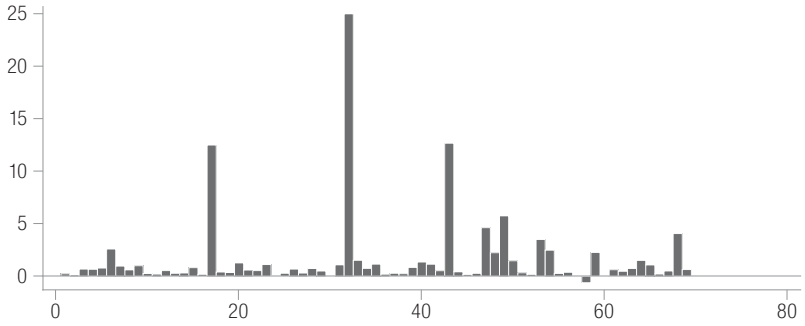
Figure 5.9 ■ Costa Rica: Timing of Adoption of the Electronic Single Window and Previous Export Growth



(continued)

Figure 5.9 ■ Costa Rica: Timing of Adoption of the Electronic Single Window and Previous Export Growth (*continued*)

Average Export Growth of Products Covered by a Permit to Specific Destinations over the Entire Period



Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduana* – DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER).
Note: The first panel reports the average annual growth rate of exports of products covered by each permit the first year in which it could be processed through the electronic single window in the main port over the three previous years. The second panel shows the average annual growth rate of the exports of all products covered by each permit at some point of the sample period over the three years previous. The third panel reports the average annual growth rate of exports of each product to each destination covered by a permit the first year in which it could be processed through the electronic single window over the three previous years. The fourth panel shows the average annual growth rate of exports of each product to each destination covered by a permit at some point of our sample period over the three previous years. Due to their large number, product-destination combinations are grouped according to the month in which their exports started to be channeled through the electronic single window. The height of the bar corresponds to the median export growth rate of all product-destination combinations joining the electronic single window in the respective months. Permit-ports and product-destinations are ordered on the x axis according to their date of introduction into the electronic single window from the earliest to the latest.

exports in the previous period, were not privileged in terms of the timing of their incorporation into the electronic single window and TICA.[27] This result is relevant from the point of view of identifying the effects of this

[27] This has been corroborated based on extensive interviews with the management of the single window at PROCOMER. More specifically, previous export performance or potential for export performance were definitely not among the criteria considered in deciding the order in which the agencies actually joined the arrangement. In addition, this has been more formally confirmed by the estimates of regressions of a binary indicator that takes a value of one if exports of products subject to a given permit (or a given product subject to a permit) could be already processed under the electronic single window in the port in question (when shipped to the destination in question) in 2008 (or in 2008 or 2009) and zero otherwise on the respective average annual export growth rate over the previous three-year period. The conclusion is the same when regressing the ranking of the permit-port or the product-destination combinations as determined based on the first date the respective shipments could be channeled through the electronic single window on the aforementioned average annual export growth rates.

arrangement on exports. It specifically suggests that there is no evident a priori reason to suspect that standard estimates of these effects would be upward (downward) biased as would be the case if best- (worst-) performing products or product-destinations would have been systematically allowed first into the single window.

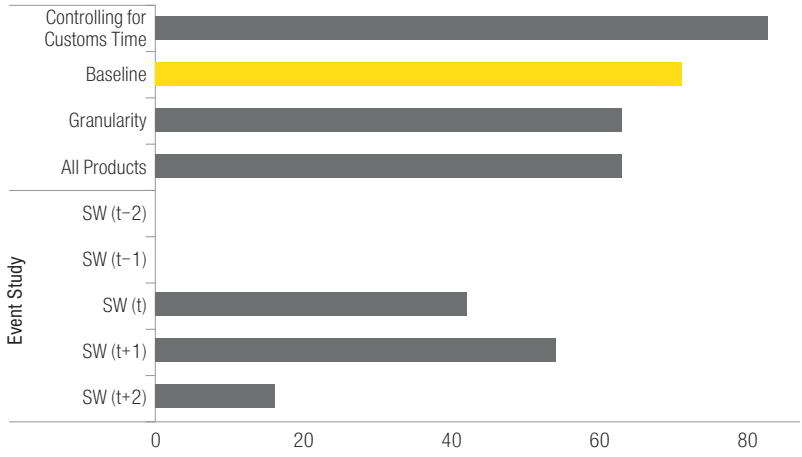
5.4 The Impact of the Electronic Single Window on Exports: Evidence from Costa Rica

5.4.1 Baseline: What Are the Effects of the Electronic Single Window on Exports?

Depending on its specific product-destination combinations, a given firm may use different ports in shipping abroad. Similarly, depending on their location, the ports utilized by firms may differ across those firms, even within product-destination combinations (e.g., firms closer to the Pacific Ocean frequently use Puerto Caldera to ship a given product to a given destination, while their counterparts closer to the Atlantic Ocean tend to use Puerto Limón to ship the same product to the same destination).[28] Thus, the gradual implementation of the electronic single window across products and of TICA for export transactions across ports creates a variation in the processing mechanism of permits both across firm-product-destination export flows at a given point in time and within such combinations over time. Importantly, given the descriptive evidence presented above, such variation in the use of the single window can be considered primarily exogenous from the point of view of firms. Hence, this variation can be exploited to identify its impact on firms' exports by comparing the before-and-after single window change in exports for firms' exports processed through the single window and firms' exports processed under the manual entity-by-entity scheme. In so doing, as mentioned in previous chapters, it is important to account for time-varying firm and product-destination-specific factors that can be related to both single window use and foreign sales, thus potentially contaminating the

[28] Over the sample period, more than 95 percent of exports by firms located on the Atlantic coast were shipped abroad from Puerto Limón and less than 1 percent from Puerto Caldera, whereas almost 50 percent of exports by peers located in the provinces on the Pacific coast exited through Puerto Caldera and only 15 percent through Puerto Limón.

Figure 5.10 ■ Costa Rica: Impact of the Electronic Single Window on Firms' Exports, 2007–2013



Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduana* – DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER). Estimates presented in this figure are reported in Tables 5, 6, and 7 in Carballo, Graziano, Schaur, and Volpe Martincus (2016b).
Note: The upper part of the figure reports the estimated percentage impact of the electronic single window (SW) on firms' export growth rates when restricting the sample to products subject to permits (Baseline), when considering all products (All Products), when weighting by the initial relative importance of trade flows (Granularity), and when customs processing times are controlled for (Controlling for Customs Time). The lower part of the figure presents results from an event study whereby the impact of the single window is estimated two years before, one year before, the year of, one year after, and two years after the first use (Event Study). Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

estimates (e.g., possible self-selection into the scheme induced by firm-level or product-destination factors such as firm productivity or product time sensitivity that also explain foreign sales).[29]

Figure 5.10 presents the estimated impact of the electronic single window on firms' exports for alternative samples and approaches. In the

[29] The baseline equation is estimated at the firm-product-destination-year level and has as the dependent variable the change in (the natural logarithm of) the export value and as the main explanatory variable the change in a binary indicator that takes the value of one if the respective shipments were processed through the electronic single window and zero otherwise, along with firm-year and HS 2-digit product-destination-year fixed effects. Standard errors are clustered by firm-product-destination. Note that results are robust to alternative sets of fixed effects (e.g., firm-HS 2-digit product-year or firm-destination-year fixed effects along with HS 2-digit product-destination-year fixed effects) and clustering of standard errors that account for other potential correlations (e.g., given that the electronic single window was implemented by procedures–i.e., (groups of) products and customs branches-destinations–there may be a correlation of exports flows across (groups of) products and destinations).

baseline case (yellow bar), the sample consists of firm-product-destination-year observations that correspond to products subject to permits. This allows for working with a more homogenous group of trade flows and specifically to focus on those products that are potentially directly affected by the change in the technology available to complete the relevant procedures. According to this estimate, the single window has been associated with 71.1 percent higher export growth. The sample average (logarithm) annual growth rate of firm-product-destination exports is 2 percent, so this would imply that exports processed under the electronic single window would have a growth rate 1.4 percentage points higher than exports subject to the noncomputerized procedures. This estimated effect is comparable when instead of restricting the sample to products whose export requires permits, all products are considered (bar labeled "All Products").[30]

As discussed in Chapter 3, although small flows are not important from an aggregate point of view, they are likely to be markedly predominant and could have experienced stronger export growth in response to implementation of the electronic single window than their larger counterparts, thus potentially having a substantial influence on the estimated average impact. However, the estimate does not significantly change when the relative importance of the flows is explicitly taken into account (bar labeled "Granularity").[31] In addition, Figure 5.10 presents estimates that account for customs processing times.[32] Again, these estimates are perfectly in line with the baseline (bar labeled "Controlling for Customs Time"). Finally, the bottom part of the figure reports estimation results when tracking the behavior of firm-product-destination export flows that adopted the electronic single window in a given year from two years before to two years after that adoption year. In accordance with a causal interpretation of the findings reported so far, these estimates are not significant before the first use of the electronic single window and become significant once this permit

[30] Estimates obtained using the mid-point growth rate as the dependent variable on a sample that includes the initial zeroes for new exports and the final zeroes for the disappearing counterparts corroborate the main findings.

[31] The baseline equation is estimated using weighted least squares, whereby the weights are the size of the export flows at the firm-product-destination level as proxied by their values in the first sample year (2007)–i.e., the year before introduction of the electronic single window.

[32] These estimates correspond to 2010-2013.

processing mechanism is used. Furthermore, while positive effects are observed even two years after adoption, their strength appears to decline over time (bar labeled "Event Study").[33]

5.4.2 Has the Electronic Single Window Been Cost-Effective?

Using the baseline estimated impact and taking into account that foreign sales subject to permits amount to approximately 30 percent of the total, it is possible to make a back-of-the-envelope calculation to quantify the impact of establishing the electronic single window on total Costa Rican exports. This calculation reveals that, in the absence of that single window, aggregate exports would have been on average 2 percent smaller than they actually were over 2008–2013, which roughly amounts to 0.5 percent of the country's GDP.[34]

On the cost side, the single window involves (prorated) development costs, annual maintenance costs, and the annual operative budget of PROCOMER's Single Window Unit. According to information kindly provided by PROCOMER, the agency invested about US$1.15 million to

[33] The baseline equation has also been estimated by instrumental variables, whereby the actual use of the electronic single window ("demand") is instrumented with a year-specific binary indicator that takes the value of one if the product in question subject to a permit could be processed through the electronic single window in the main port from which it is normally shipped to each destination and zero otherwise ("supply"), or the interaction between that indicator and the share of that main port in the firms' exports in the respective product-destination combination. The instrumental variables estimates concur in suggesting that the electronic single window has fostered an increase in firms' exports. The same is true when a location-based instrument is alternatively used, namely, a binary indicator that takes the value of one if the product whose foreign sales requires a permit could be processed under the new scheme in a port within the same province in which the firm is located and zero otherwise, or the interaction between the share of this port in the respective product-destination combination.

[34] It can conceivably be argued that launching the electronic single window to process the permits required to export a given product in a given port could favor exports from users at the expense of those from nonusers. For instance, fewer resources could have been devoted to process noncomputerized permit applications. Whether this was the case can be informally assessed by estimating the baseline equation on a sample in which the control group is restricted to HS 4-digit products encompassing HS 10-digit products using and not using the electronic single window and on a sample in which the control group is restricted to HS 4-digit products without HS-10 digit products using the electronic single window. These estimates do not differ from the baseline and henceforth indicate that such potential cross-effects are not a major concern.

develop the platform for both exports and imports.[35] Maintenance costs are covered through usage fees of US$3 per transaction. Over the sample period, an average of 163,000 export transactions was processed through the electronic single window per year. Finally, the average total annual operative budget of PROCOMER's Single Window Unit over the period was about US$570,000.

Given the estimated trade gains and these costs, the implied benefit/cost ratio of the electronic single window is approximately US$16 per each US$1 spent on the scheme.[36] Needless to say, these estimates are only indicative and should be taken with extreme caution.

5.4.3 The Channels: How Does the Electronic Single Window Affect Exports?

As in previous chapters, the channels through which the electronic single window affects exports can be disentangled by estimating its effects on the shipped quantity (weight), unit values, number of buyers, and average value and quantity per buyer. For 2010–2013, this can also be done for the number of shipments and the average value and quantity per shipment (Figure 5.11).[37] The estimated effects reveal that the streamlined administrative procedures thanks to the incorporation of information technology have positively affected the number of buyers to which firms sell, average sales to these buyers in terms of both value and quantity, and thereby the quantity shipped. Thus, the new permit processing mechanism has been associated with an increase in the growth rate of the number of buyers of 22.4 percent and in the growth rate of the average sale per buyer of 43.5 percent, respectively.

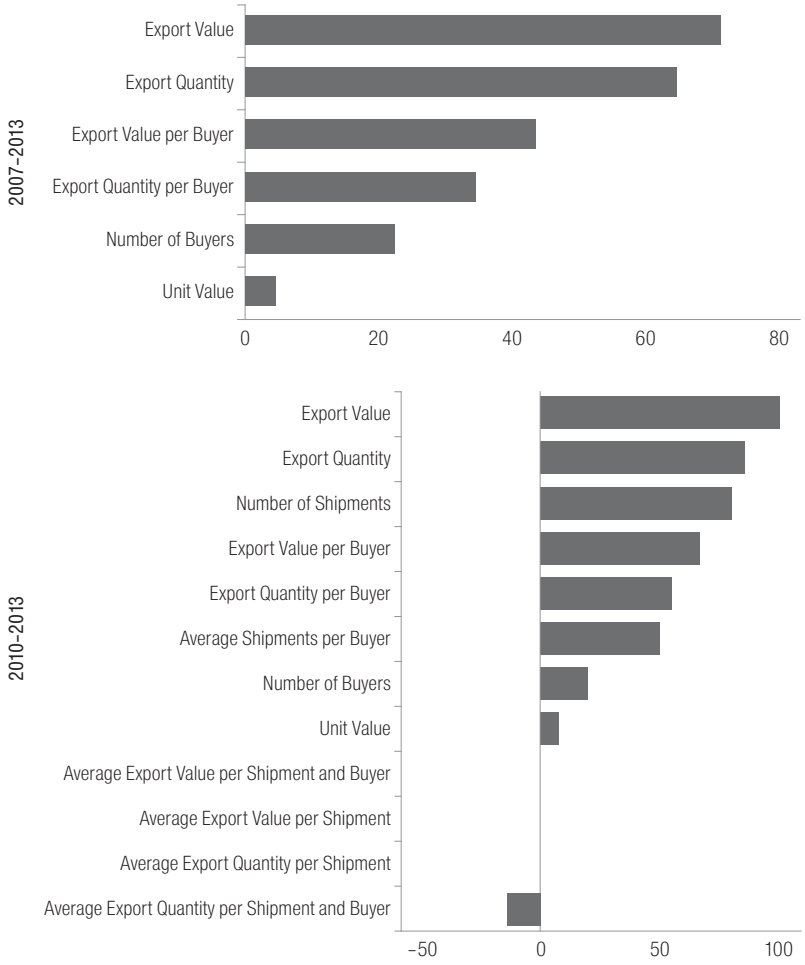
It should be noted that the electronic single window has had a significant positive impact on the number of shipments. In fact, increased shipping frequency appears to be the main driving force behind the

[35] This value has been computed based on a careful accounting exercise. Nevertheless, given the historical nature of this exercise, there is a risk that expenses have not been fully registered. Hence, the amount reported in the text should be taken as approximate and specifically as a lower bound estimate of the actual development costs.

[36] The benefits used to compute the benefit/cost ratio reported in the text do not include the savings for the public administration associated with the reduction in the number of officials who have to be assigned to handle permits. If these savings were included, the ratio would be around 20 to 1.

[37] The estimating equation is the baseline with different dependent variables.

Figure 5.11 ■ Costa Rica: Impact of the Electronic Single Window on Firms' Export Channels, 2007–2013 and 2010–2013



Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduana* – DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* - PROCOMER). Estimates presented in this figure are reported in Table 8 in Carballo, Graziano, Schaur, and Volpe Martincus (2016b).
Note: The upper panel shows the estimated percentage impact of the electronic single window on the growth rate of firms' export value, quantity (weight), export value per buyer, export quantity per buyer, number of buyers, and unit value for 2007–2013. The lower panel reports the estimated percentage impact of the electronic single window on the growth rate of firms' export value, quantity (weight), number of shipments, export value per buyer, export quantity per buyer, average shipments per buyer, number of buyers, unit value, average export value per shipment and buyer, average export value per shipment, average export quantity per shipment, and average export quantity per shipment and buyer for 2010–2013. Effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

observed export expansion. On the other hand, there is generally no effect on shipment size either overall (i.e., across buyers) or for specific exporter-importer relationships (i.e., within buyers). If anything, quantity per shipment decreases within seller-buyer relationships. This is exactly what one would expect if the implementation of this new system made possible a reduction in the per-shipment fixed costs. More precisely, the estimates indicate that, thanks to such a cost reduction, firms are able to place smaller shipments at higher frequency, either to try to hit customers' preferred arrival date or to supply the markets with demand uncertainty. Moreover, there is a positive and marginally significant effect on unit values. Overall, the pattern of the coefficient estimates suggests that customers value the shorter lead times and sellers are able to absorb some of the implied quality improvement with higher prices.

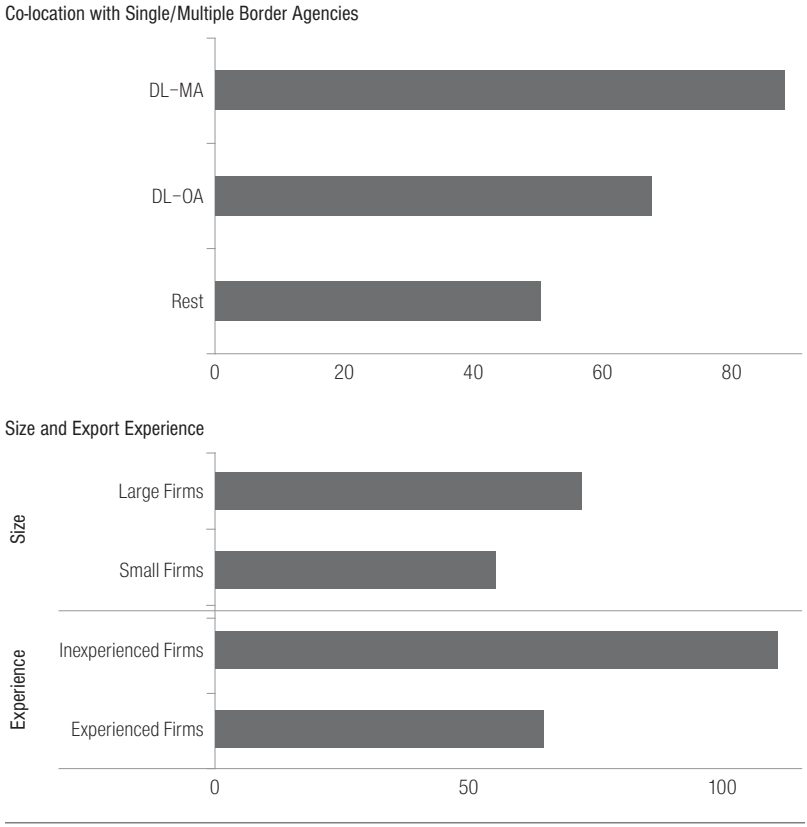
5.4.4 The Distributional Angle: Are the Export Effects of the Electronic Single Window Heterogeneous across Firms, Products, and Destinations?

The estimates reported in the upper panel of Figure 5.12 indicate that effects are heterogeneous across firms.[38] Thus, the impact of the electronic single window has been stronger for firms that are located in regions (*cantones*) without offices of the issuing organizations and, due to their export portfolios, when the public entities from which the firms have to obtain their permits are many and not just one. These firms are precisely those that experienced larger savings in the costs and time associated with visiting these offices.[39] The lower panel of Figure 5.12 reveals that continuing export flows from larger firms seem to have benefited slightly more from the computerized procedures than their

[38] Heterogeneous effects are estimated by modifying the baseline equation to include interactions of the main explanatory variable with binary indicators that identify the relevant groups.

[39] Interestingly, estimation results reveal that the electronic single window has had a positive and significant impact on unit values of exports from firms that do not co-locate with border agencies (especially when these are multiple) but an insignificant effect on the unit values of peers that do not suffer from that locational disadvantage. This would suggest that, thanks to the decentralization of administrative procedures associated with information technology, firms with longer times to obtain and present permits could reduce their lead times and exploit consumers' valuation of these shorter lead times by increasing prices.

Figure 5.12 ■ Costa Rica: Impact of the Electronic Single Window on Firms' Exports, by Firm Groups, 2007–2013



Source: Author's calculations based on data from Costa Rica's customs agency (Dirección General de Aduana – DGA) and national trade promotion agency (Promotora del Comercio Exterior de Costa Rica - PROCOMER). Estimates presented in this figure are reported in Tables 9 and 10 in Carballo, Graziano, Schaur, and Volpe Martincus (2016b).
Note: The upper panel shows the estimated percentage impact of the electronic single window on firms' export growth rates for firms that have to interact with more than one border agency and the offices of these agencies are located in other regions (DL-MA); on exports from firms that have to interact with only one border agency with offices in other regions (DL-OA); and on exports from firms that have to interact with one or many border agencies that are present in their own regions (Rest). Locations (regions) are defined in terms of cantons. The lower panel reports the estimated percentage impact of the electronic single window on firms' export growth rate for large firms (i.e., firms with more than 100 employees) and small firms (i.e., firms with up 100 employees) and for new-to-export firms (i.e., firms that started to export after 2007) and experienced exporters (i.e., firms systematically exporting since 2005).

Figure 5.13 ■ Costa Rica: Impact of the Electronic Single Window on Exports, Different Aggregation Levels, and Export Margins, 2007–2013

Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduana* – DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER). Estimates presented in this figure are reported in Table 10 in Carballo, Graziano, Schaur, and Volpe Martincus (2016b).
Note: PDT: Data at the product-destination-year level; PT: Data at the product-year level. Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

counterparts from the smaller firms. Interestingly, new-to-export firms gained significantly more than experienced peers.[40]

The previous distributional effects are limited to existing trade flows at the firm-product-destination level (i.e., export intensive margin). One way to establish the impact of the new permit processing mechanism on diversification (i.e., export extensive margin) in general, and on firms' decision to venture into foreign markets for the first time in particular, is

[40] Employment data are from the Costa Rican Social Security Institute (*Caja Costarricense de Seguro Social – CCSS*). The employment threshold corresponds to the classification used by the CCSS (2007). In particular, firms with up to 100 employees are considered small and medium-sized, whereas those with more than 100 employees are considered large (Volpe Martincus and Carballo 2012). Results do not change if different break points are used to classify firms in terms of their size (i.e., 50 employees or 200 employees) or impose the condition that small and large firms export in the same product-destination combinations.

to work with data at a more aggregated level, namely, at the product-destination-year (PDT) level and the product-year (PT) level. Estimated effects obtained on data at this level, which are reported in Figure 5.13, suggest that the actual simplification of procedures made possible by the introduction of the electronic single window seems to have favored export diversification across destinations. Moreover, it has had a significant positive impact on the firms' extensive margin and thus appears to have indeed helped new firms enter into export markets.[41] In fact, when the growth of export values associated with the new arrangement is decomposed into the firms' intensive and extensive margins, the increase in the number of exporting firms accounts for 48 and 37 percent of the export expansion at the product-destination and product levels, respectively. Further, when additionally allowing for differentiation between small and large firms, the estimated effects reveal that the streamlined procedures have been effective in helping small firms penetrate foreign markets.

There are also heterogeneous effects across products. More specifically, effects are consistently larger on exports of food and textile products.[42] As explained in Section 5.3, these are precisely the products whose exports are more heavily subject to permits.[43] These results are accordingly in line with those obtained when looking at the electronic single window impact from the angle of the permits to which these products are subject (upper panel of Figure 5.14).[44]

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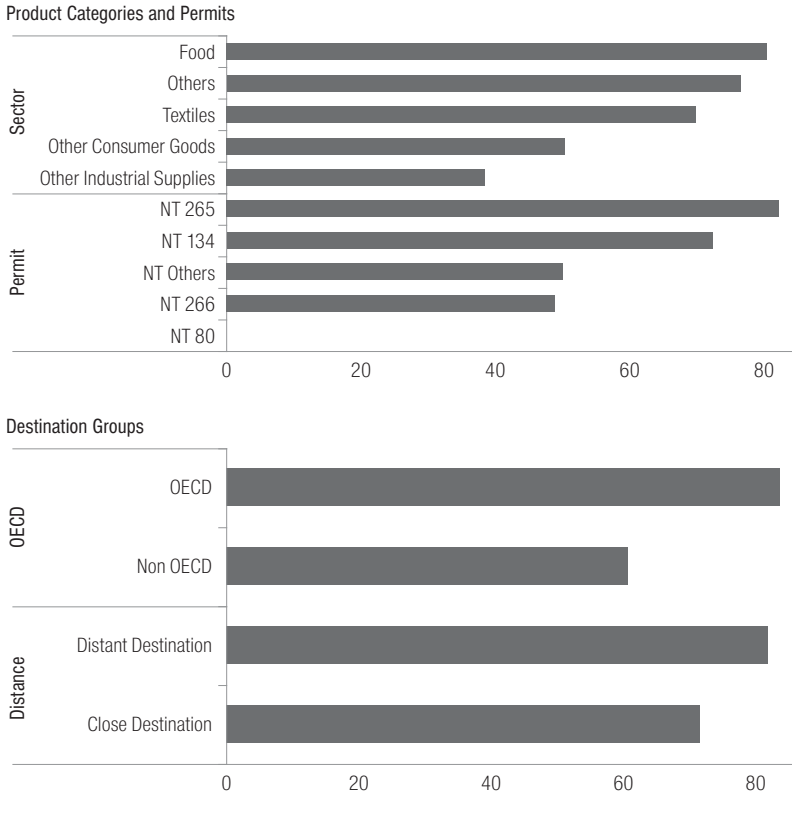
[41] In these cases, the main dependent variable is the change in (the natural logarithm of) the number of firms registering exports in the product-destination or the product in question and the main explanatory variable is the change in the electronic single window indicator at the respective level along with HS 2-digit product-destination-year fixed effects or HS 2-digit product-year fixed effects, respectively. By aggregating away firms, this strategy also has the advantage that estimates are less prone to be affected by potential self-selection and granularity problems.

[42] These two product categories accounted for more than 20 percent of total Costa Rican exports and approximately 60 percent of exports subject to permits in recent years.

[43] In fact, products requiring more permits have experienced larger export gains with the introduction of the electronic single window.

[44] No effect is found on exports subject to Technical Note 80, which corresponds to coffee. Several reasons can explain this result. First, the characteristics of the good are likely to matter. For example, coffee is not perishable, as are other food products. Second, Technical Note 80 aims to ensure that exports meet preset quality standards and thereby protect Costa Rica's reputation as a producer and supplier. As such, its nature is different from the nature of most of its counterparts. Third, the relative level of efficiency with which permits were processed before the electronic single window could have also played a role.

Figure 5.14 ■ Costa Rica: Impact of the Electronic Single Window on Firms' Exports, by Product and Destination Groups, 2007–2013



Source: Author's calculations based on data from Costa Rica's customs agency (*Dirección General de Aduana* – DGA) and national trade promotion agency (*Promotora del Comercio Exterior de Costa Rica* – PROCOMER). Estimates presented in this figure are reported in Tables 11 and 12 in Carballo, Graziano, Schaur, and Volpe Martincus (2016b).
Note: The upper panel reports the estimated percentage impact of the electronic single window on firms' export growth rates of different product categories (food products, textile products, other industrial supplies, other consumer goods, and other goods) (upper part) and for different permits (Technical Notes [denoted here as "NT"] 80, 134, 265, 266, and others) (lower part). The lower panel presents the estimated percentage impact of the electronic single window on firms' export growth rates to Organization for Economic Cooperation and Development (OECD) destinations and non-OECD destinations, and to close destinations (i.e., countries whose distance to Costa Rica is up to the median of the respective distribution) and distant destinations (i.e., countries whose distance to Costa Rica is above the median of the respective distribution). Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

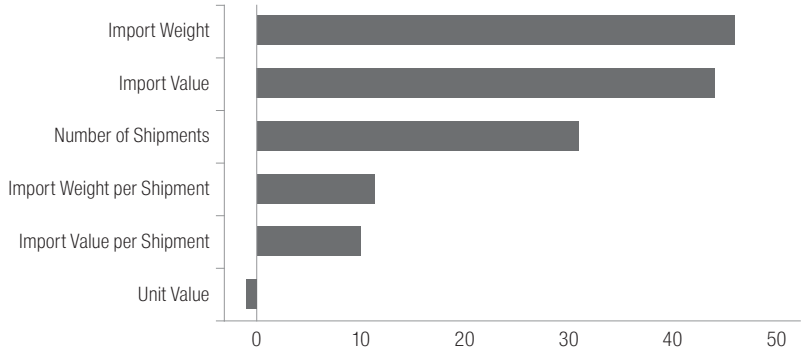
Finally, effects also seem to vary across destinations. In particular, the positive response of foreign sales to computerized border procedures has been stronger in exports to developed country markets (OECD countries), where competition tends to be more intense and demand for quality higher.

Estimates reported in the lower part of the figure suggest that this seems to be at least partially related to the distance to the different destinations (lower panel of Figure 5.14).[45] This qualitatively coincides with the cross-destination impact of customs processing times on firms' exports in Uruguay (see Chapter 2). Interestingly, nonreported estimation results suggest that this differential impact is larger along the buyer-extensive margin.

5.5 External Validity: Are Effects Exclusive to Costa Rica's Exports? Evidence from Colombia's Imports

Colombia also implemented an electronic single window through which import-related permits started to be processed in 2005. As with Costa Rica, implementation was gradual in terms of border agencies and procedures, and accordingly by (groups of) products. Using data comparable to those

Figure 5.15 ■ Colombia: Impact of the Electronic Single Window on Firms' Imports, 2004–2014



Source: Author's calculations based on data from Colombia's Ministry of Trade, Industry, and Tourism (*Ministerio de Comercio, Industria y Turismo* - MINCIT) and Department of Taxes and National Customs (*Departamento de Impuestos y Aduanas Nacionales* – DIAN).
Note: The figure reports the estimated percentage impact of the electronic single window on the growth rate of firms' import value, quantity (weight), unit value, number of shipments, import value per shipment, and import quantity per shipment for the period 2004–2014.

[45] In addition, the electronic single window seems to have resulted in increased unit values in close-by destination but no changes in far-away destinations. Shorter lead times can therefore be seen as akin to quality upgrade that allows firms to raise prices, particularly in nearby markets. This is consistent with Evans and Harrigan (2005) and Hornok and Koren (2015a), who precisely highlight that time-sensitive products, for which short lead times are important, are imported from close-by locations, and that consumers value their timely arrival.

from Costa Rica kindly provided by Colombia's Ministry of Trade, Industry, and Tourism (*Ministerio de Comercio, Industria y Turismo* - MINCIT) and Department of Taxes and National Customs (*Departamento de Impuestos y Aduanas Nacionales* - DIAN) and applying the same methodological approach as before, the impact of the scheme on several import outcomes has been quantified. Estimated effects, which are presented in Figure 5.15, are qualitatively similar to those observed in Costa Rica. In particular, the growth rate of firms' imports processed through the single window was approximately 40 percent higher than that of imports subject to the separate, manual process. This amounts to additional growth of 3.9 percentage points. Also in this case, the main channel of the effect is the shipment frequency. Thus, the single window has made it possible for Colombian firms to source more and better from abroad, primarily through more frequent shipments. While additional research is needed to establish how these arrangements work in other countries, these results seem to suggest that effects are neither exclusive to Costa Rica nor limited to exports.

5.6 Summary and Conclusions

Getting products out of a country can be more laborious than is normally assumed. It is not only about reaching the border and how this is influenced by the availability and quality of transport infrastructure; it is also about the borders themselves. Border agencies and the regulations with which firms must comply when trading may create a border formality labyrinth that can be hard to traverse.

Streamlined procedures can shrink these borders, thereby facilitating the movement of goods across them. Information and communications technologies can be a key element in making these trade facilitation initiatives effective. This chapter has examined the gradual adoption of an electronic trade single window scheme in Costa Rica and identified the effects of the associated information-technology-driven simplification of trade formalities on firms' exports. These results suggest that the introduction of this new scheme has indeed facilitated trade. It has been associated with an increase in exports by firms whose products require permits. Such an increase in exports can be traced back to higher shipping frequency, buyer diversification, and greater sales per buyer. This effect has been specifically stronger for firms that have to interact with several public agencies without offices in the regions where these firms are located. This

points to the benefits of relaxing geographical constraints that come with the creation of a virtual exporters-agencies interface. Also important, the number of exporters has responded positively to implementation of the electronic single window. This implies that streamlined trade processing thanks to information technology reduces export entry costs.

The message for policymakers that comes out of this analysis is very clear. Borders can be significantly narrowed and trade gains accordingly substantial if all border agencies are effectively and fully virtually integrated and their operation is properly coordinated (e.g., avoiding different working times and maximizing automated procedures to the extent possible). To date, most Latin American and Caribbean countries have at best a virtual scheme whereby firms have to submit their customs declarations and permit requests through two separate entry points—the customs information system and the other border agencies' joint information system (i.e., in fact a two-window arrangement)—whose communication in the documentary processing of shipments can be more or less automated. Countries in the region should integrate these systems in an automated manner and, ideally, work toward establishing a true single entry point to complete all relevant trade procedures covering all border agencies, as some peers in Asia have already done (e.g., Japan, Korea, and Singapore) and some countries in the Americas (e.g., Brazil, Mexico, and the United States) are in the process of doing.[46]

Further, Latin American and Caribbean countries should also start moving toward the next frontier: internationally interoperable single windows and regional initiatives to connect and integrate national single windows—such as that ongoing among Association of Southeast Asian Nations countries—that will allow cross-border exchanges of relevant trade data and documents (e.g., declarations and certificates of origin). How far are Latin American and Caribbean countries from that frontier? Table 5.3 describes the readiness of selected countries in the region along a few key dimensions. While Mexico and Central American countries seem a priori to be somewhat relatively more advanced in certain dimensions, in general much remains to be done in this area. At the regional level, in addition to those incipient activities in Central

[46] WEF, Bain & Co., and ITC (2015) and Scorza (2016) describe in detail the Brazilian single window initiative and how it was designed and implemented in collaboration with the private sector.

Table 5.3 ■ Selected Latin American and Caribbean Countries: Single Window Interoperability, 2015

Country	Interoperability with Private Sector Providers' Systems	Alignment of Procedures with Neighbors and Third Countries	Alignment of Data Requirements with Neighbors and Third Countries	Data Exchangeable with Partner Countries
Argentina	Partial	No	No	No
Brazil	No	No	No	No
Chile	Partial	Partial	Partial	No
Costa Rica	Partial	Partial	Partial	No
Ecuador	Yes	Yes	n.a.	Yes
El Salvador	Yes	Partial	Partial	Partial
Honduras	Yes	No	No	No
Mexico	Yes	Yes	Yes	Yes
Paraguay	Partial	No	No	No
Peru	No	No	No	No
Trinidad and Tobago	No	No	No	No
Uruguay	Partial	Partial	n.a.	No

Source: Prepared by the author based on information directly provided by countries' agencies and compiled in IDB-OECD (2015) and information provided by IDB specialists in the field.
Note: n.a.: not available.

America, interconnection efforts among member countries of the Pacific Alliance are worth highlighting.[47]

In closing this chapter, it should be mentioned that computerization is not a panacea. Poorly designed procedures that result in a cumbersome process of compliance with trade regulations will not become mechanically efficient with the introduction of information technology. A careful redesign of procedures is a pre-condition for the adoption of this technology to yield trade gains.[48] Costa Rica is a clear example in this regard.

[47] Pacific Alliance countries (Chile, Colombia, Mexico, and Peru) conducted a pilot in July 2016 whereby single windows of member countries exchanged harmonized data on the phytosanitary certificate for specific transactions.

[48] Ulloa and Robert (2015) discuss in detail this crucial aspect of a single window design. They also highlight the importance of having a strategic vision from the beginning of the process of establishing this arrangement.

The country first streamlined procedures with the establishment of the paper-based single window in the mid-1990s and then further simplified them with the launching of the paperless electronic single window in the mid-2000s once the required technology became available.

>> Facilitating Trade Across Borders: Regional Transit Regimes

6

6.1 International Transit

Goods frequently have to be transported through intermediate countries when shipped over land. This is technically known as "international transit." Such transit accounts for a substantial portion of foreign trade. For instance, in El Salvador, road transport accounts for 96 percent of exports to the neighboring Central American countries of Costa Rica, Guatemala, Honduras, Nicaragua, and Panama, and roughly one-third of these exports are carried through a country that is not the shipment's final destination.[1]

Without explicit special provisions for international transit, deliveries need to undergo a succession of import and export border clearance procedures including filling out paper-based documents and in some cases even loading and unloading trucks. These repetitive procedures create substantial congestion at the borders and lead to a major escalation in transaction costs, thereby imposing significant costs on importing and exporting firms.[2] Under well-functioning transit regimes, in contrast, the administrative burden is decentralized away from entry points to lower the costs of border crossing. Thus, shipments flow through third

[1] Overland trade is overwhelmingly prevalent among neighboring countries. For instance, the median share of road and rail in total intra-European Union trade is 95.7 percent (Cristea, Hummels, Puzzello, and Avetisyan 2013).

[2] See Arvis, Carruthers, and Willoughby (2008).

countries under customs control but without being cleared by customs.[3] More precisely, customs clearance is delayed, so that there is no need to import and re-export the products at intermediate points or to pay import duties, domestic consumption taxes, or other charges, and go through the processes associated with import regulations.[4]

6.2 An Old Problem and New Solutions?

6.2.1 An Old Problem

Long-distance trade crossing several territories has existed for centuries.[5] During the Roman Empire, goods were transported between regions far apart from one another.[6] The collapse of the empire in the fifth century left behind a pronounced political fragmentation in Western Europe. Several states were created and accordingly customs and duties and charges multiplied, negatively affecting long-distance trade.[7] Duties were imposed on both trade and transit. As for the latter, for instance, in Italy during the Middle Ages *telonei* (indirect taxes) were collected at gates (*portaticum*) and landing places (*repaticum*). Even though duty rates were low, their number was very high. For example, ships going from Linz to Vienna along the Danube River were subject to 77 different customs checks and duties (Figure 6.1).[8]

As inland transportation between cities progressed, different strategies began to be used to facilitate transit and trade. The transit system applied in the Duchy of Milan in Northern Italy is illustrative in this regard. Shipments of goods were sealed by customs officers at the main inland gateway of the duchy and carnets were issued. Upon arrival at the final destination,

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[3] See Arvis, Raballand, and Marteau (2007).

[4] Transit can take place in the country of destination/origin of the goods (national transit) or in a third country where the products are taken from an entry post to an exit post (international transit). Thus, a complete transit operation consists of a sequence of national and international transit links (Arvis, Raballand, and Marteau 2007). More generally, international transit is relevant not only for trade with nonborder partners, but for all shipments crossing two different customs territories, as exports to immediate neighbor countries can receive similar treatment when originated in internal customs.

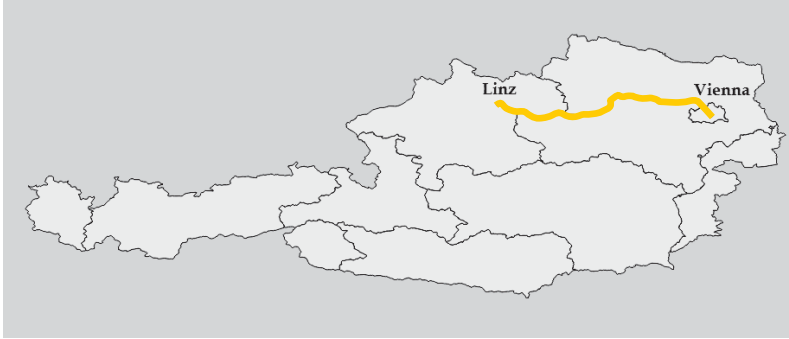
[5] See Helpman (2011). The Silk Road connecting Europe and Asia is probably one of the most well-known and well-documented trading routes (von Richthofen 1877).

[6] See McCormick (2001).

[7] See Arvis (2005).

[8] It should be mentioned herein that the fiscal burden was reduced through free fairs and free zones (Nicali 2002).

Figure 6.1 ■ Europe in the Ancient Times: Transit from Linz to Vienna along the Danube River



Source: Prepared by the author based on ArcGIS and Google Maps.
Note: The figure shows the river-based route between Linz and Vienna.

seals were removed and duties paid. At this stage, local officers sent all relevant data about the shipment in transit to the central office in Milan.[9]

6.2.2 New Solutions?

Countries have designed different procedures to handle international transit. In the most basic and common variants, there are separate controls on each side of the border and procedures require the submission of paper documents. In contrast, in the most advanced versions, transit regimes involve unified border transit controls along with the use of a common electronic document to simultaneously comply with all relevant transit border formalities. This streamlining of border procedures allows for a substantial reduction in delays and trade costs and can therefore facilitate international transit operations and cross-border trade.

Thus, in Europe, the transit principles developed during the Renaissance outlined above became the cornerstones of the single door-to-door transit regime called International Road Transport (TIR for its name in French – *Transports Internationaux Routiers*) established in the early 1950s. This regime consisted of a single harmonized manifest (TIR carnets) issued in the country of origin and used at every border; authorized operators

[9] See Favier (1971).

whereby only qualified operators could participate; a mutually recognized system of privately managed guarantees; an overseeing agency (the United Nations Economic Commission for Europe - UNECE); and a clearinghouse of carnets and guaranties (the International Road Transport Union) that federates the national associations of operators. The TIR eliminated duplication of procedures and significantly sped up movements of goods across borders.[10] The transit regime later evolved into a common transit regime for the European Union (EU) and the European Free Trade Association and a single transit regime for the EU as a customs union. It became fully computerized with the New Computerized Transit System.[11]

In contrast, well-functioning transit regimes are virtually absent in most developing regions. The reasons include both inappropriate design due to lack of cooperation between relevant public and private parties and pressure from interest groups (e.g., the *Transit Routier Inter-Etats* in Western Africa), and the inability to implement the regime due to institutional weakness (e.g., sub-Saharan Africa).[12] The picture does not differ much among partners in trade agreements. Only 36.4 percent of the agreements notified to the World Trade Organization/General Agreement on Trade and Tariffs—agreements which typically involve neighboring countries—had provisions to facilitate transit as of June 2013.[13]

One notable exception in this desolate landscape is the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* - TIM) system. The TIM, one of the few operating regional transit systems in the developing world, covers border crossings between Costa Rica, El Salvador, Honduras, Nicaragua, Panama, and Mexico. It is the case study upon which this chapter will focus.

6.3 Case Study: The Central American International Transit of Goods System from a Salvadoran Perspective

6.3.1 The Central American International Transit of Goods System

Until very recently, Central American exporters with shipments in transit had to clear customs at each side of the bilateral borders among these countries

[10] See Arvis (2004) for a detailed description of the TIR.
[11] See Arvis, Carruthers, and Willoughby (2008) and European Communities (2001).
[12] See Arvis, Carruthers, and Willoughby (2008).
[13] See Neufeld (2014).

Figure 6.2 ■ El Salvador: Typical Export Route to Panama

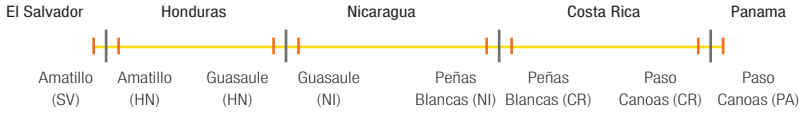
Source: Prepared by the author based on data from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* – TIM) system.

and sequentially present various paper documents to the different intervening agencies, including printed copies of international transit declarations, country-specific sanitary and phytosanitary certificates, and migration arrival and departure cards that had to be filled in at each border office.

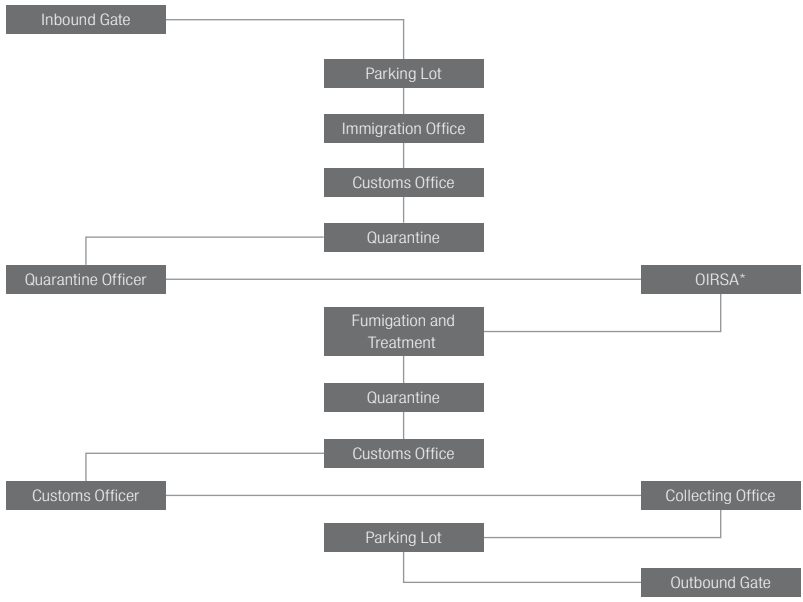
This can be seen in Figure 6.2, which shows the typical road-based export route from a El Salvador to a nonborder partner such as Panama going through Honduras, Nicaragua, and Costa Rica, and in Figure 6.3, which describes in a stylized manner the border controls to which shipments along this route were subject and what the administrative processing of these shipments at each border office looked like. In particular, according to a survey conducted at El Amatillo, a border crossing between El Salvador and Honduras, 12 sets of copies of generally the same declaration and complementary documents had to be prepared and distributed among officials of intervening agencies.[14] Transit of goods in Central America was

[14] See Sarmiento (2013).

Figure 6.3 ■ El Salvador: Stylized Processing of an Export Shipment to Panama Prior to Implementation of the Central American International Transit of Goods System



At each of the eight border posts, an export shipment had to go through the following process:

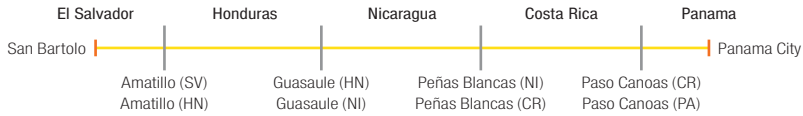


Source: Prepared by the author based on Sarmiento (2013).
Note: OIRSA: Regional Organization for Animal and Plant Health.

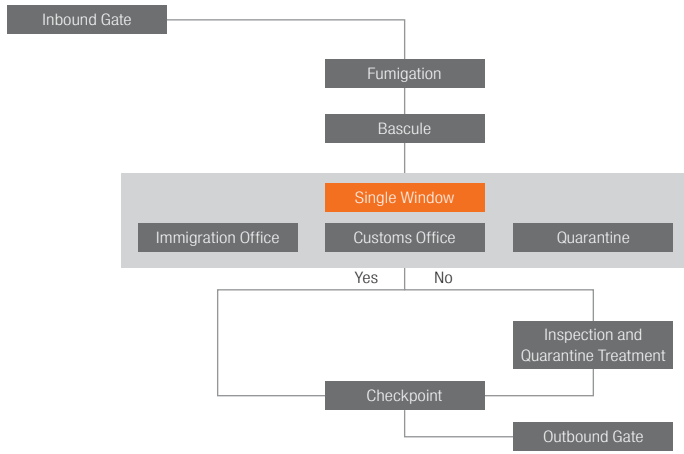
therefore characterized by lack of coordination of border agencies, cumbersome and slow customs and other border administrative procedures, and limited use of information technology.

The TIM adopted by the Central American countries in recent years is an electronic transit system, partially based on the European system, to manage and control the movement of goods in transit. This system involves (1) stronger within- and across-country interagency cooperation; (2) a reengineering of the processes whereby previous multiple paper-based declarations have been harmonized into a single and comprehensive document that gathers all data required by customs,

Figure 6.4 ■ El Salvador: Stylized Processing of an Export Shipment to Panama under the Central American International Transit of Goods System



At each of the eight border posts, an export shipment had to go through the following process:



Source: Prepared by the author based on Sarmiento (2013).
Note: OIRSA: Regional Organization for Animal and Plant Health.

migration, and phytosanitary agencies, and a single unified border transit control has been created; and (3) the use of information technology to interconnect the intranet system of all agencies participating in the initiative to manage and track the international transit process and carry out risk analysis and cargo controls.[15]

Figure 6.4 shows how the same shipment from El Salvador to Panama outlined in Figures 6.2 and 6.3 is processed under the new scheme. Instead of repetitive paper-based procedures initiated at the border, firms can now complete a single electronic transport document (*Documento Único de Transporte* - DUT) at their closest customs office. This has substantially lowered the time and cost to prepare documents. Furthermore,

[15] See Sarmiento, Lucenti, and García (2010).

under the new system, firms can start transit at that customs office and finish it at the final destination in the importing country. At the borders, controls are carried out at only one of the customs offices on each side by scanning the bar code in the DUT, which shows intervening officials all the relevant information on the shipment in the system, thus precluding the need to present multiple paper documents. More specifically, shipments in transit are now processed via an electronic single window (see Chapter 5), whereby carriers interact simultaneously and in the same place with all border agencies (customs, migration, and quarantine) without using printed copies of documents. This new process has significantly expedited border crossings.[16] In addition, the information system introduced with the TIM provides trading and transport companies with real-time data on their shipments, thereby making it easier to control orders and to manage their servicing and inventories.

In short, the TIM has implied simplification of clearance procedures, gradual adoption of a single electronic form, interconnection of all relevant border agencies to enable a one-stop clearance at each bilateral border, and real-time control of shipments. This has significantly reduced document preparation costs, sped up document review and processing at the borders, and facilitated information flows on shipments.

6.3.2 Implementation of the Central American International Transit of Goods System in El Salvador

El Salvador was the first country to adhere to the TIM as a transit territory. The TIM entered into force gradually over 2011–2013 for road-based shipments originating in this country. More precisely, individual corridors or specific origin-customs-destination segments—the so-called fiscal routes—were sequentially incorporated into the regime. In a first phase, the TIM was applied to trade operations starting at internal, "nonborder" customs posts (San Bartolo, Comalapa, and Santa Ana), free trade zones, and the coastal customs post at Ajacutla, and en route to (specific destinations in) Guatemala and Mexico through La Hachadura or San Cristóbal, en route to (specific destinations in) Honduras through El Poy or El Amatillo, and en route to (specific destinations in) Nicaragua through Guasuale (fiscal

[16] See Sarmiento, Lucenti, and García (2010).

Figure 6.5 ■ El Salvador: Gradual Phase-in of the Central American International Transit of Goods System Across Trade Corridors

Source: Prepared by the author based on data from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* – TIM) system.
Note: The figure shows the stepwise implementation of the TIM across trade corridors. Trade corridors that started to operate with the TIM in 2011 are colored in black, whereas trade corridors that started to operate with the TIM in 2012 and 2013 are colored in red.

routes colored in black in Figure 6.5).[17] Note that when shipments originate at internal customs posts, they are in transit within El Salvador. The reason is that there is an intermediate customs territory between the origin and the final destination, in this case, El Salvador's general customs territory. This is why international transit is applicable and TIM was required for these exports. All exports to the two immediate neighboring countries (Honduras and Guatemala) initiated at border customs do not transit in El Salvador. Hence, these exports just need a standard customs export declaration and accordingly have not been directly affected in terms of how they are administratively processed.

[17] See Salvadoran Customs Administrative Decision DGA-013–2011.

In a second phase, the TIM was primarily extended to exports to Nicaragua through El Espino and Las Manos and to Costa Rica and Panama via El Amatillo, Guasaule, Peñas Blancas, and Paso Canaos (fiscal routes colored in red in Figure 6.5).[18] This addition of corridors was due to decisions of other Central American countries to take part in the new transit regime (i.e., Costa Rica and Panama) or to incorporate new trade routes (i.e., Guatemala, Honduras, and Nicaragua). In the third phase, new corridors joined in 2013 as the TIM was further phased in in those neighboring countries.

6.3.3 Data

The Salvadoran customs agency (*Dirección General de Aduanas* - DGA) and the TIM working group kindly provided two databases to assess the impact of the transit scheme on trade. The first database includes transaction-level export data from 2007 to 2013 from El Salvador. Specifically, each record includes a firm's identification number, the product code (HS 8-digit), the customs post through which the shipment exits El Salvador, the destination country, the foreign buyer, the transport mode, the export value in U.S. dollars, and the quantity (weight) in kilograms. The second database is also transactional and corresponds to the TIM. It shares several fields with the customs database, which makes it possible to merge them. The TIM database therefore allows the specific transactions that were processed under the regional transit scheme to be identified, along with the year when they took place.

The TIM applies to road transit trade among the Central American countries (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), trade with Mexico, and trade with other countries by sea transiting through the Central American countries' territories (e.g., exports from El Salvador to Germany via Puerto Cortez in Honduras) (Figure 6.5). The analysis below only considers road-based exports to neighboring countries and primarily multimodal exports to third countries.[19] The conditions of common destinations and common transport modes across status of usage of the transit regime are imposed and air-shipped exports are therefore excluded.

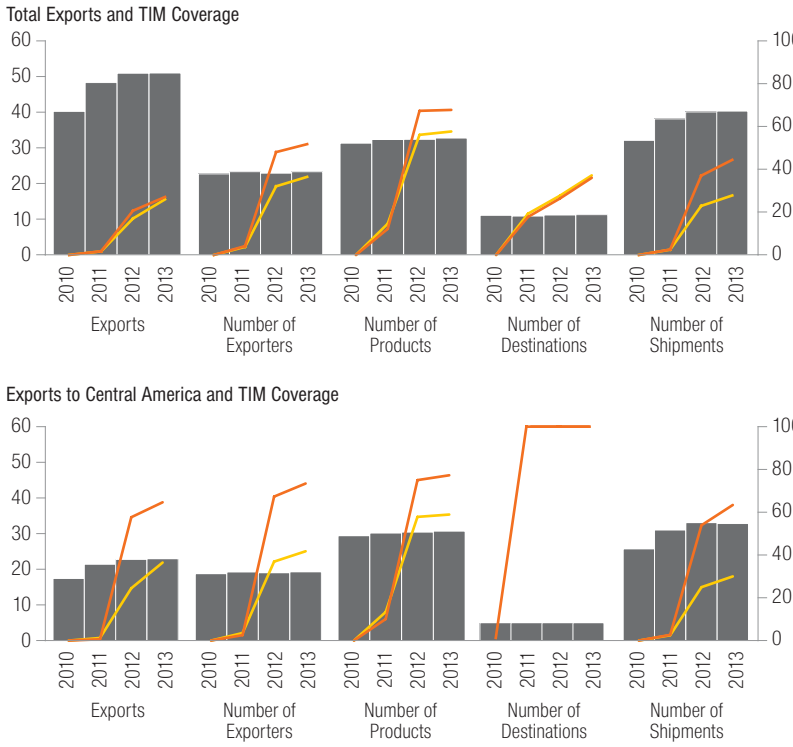
[18] See Salvadoran Customs Administrative Decision DGA-011–2012.

[19] Given that the TIM also applies to relevant exports to extra-regional countries, it is not obvious that it should specifically affect the share of Central America in these exports.

6.3.4 The Central American International Transit of Goods System in El Salvador's Exports and the Average User

Figure 6.6 reports El Salvador's total exports and key aggregate extensive margin indicators, both overall (upper panel) and to Central American neighbors (lower panel) (gray bars, left y axis), along with the respective

Figure 6.6 ■ El Salvador: Aggregate Export Indicators and Central American International Transit of Goods System Coverage, All Destinations and Central American Destinations, 2010 and 2013

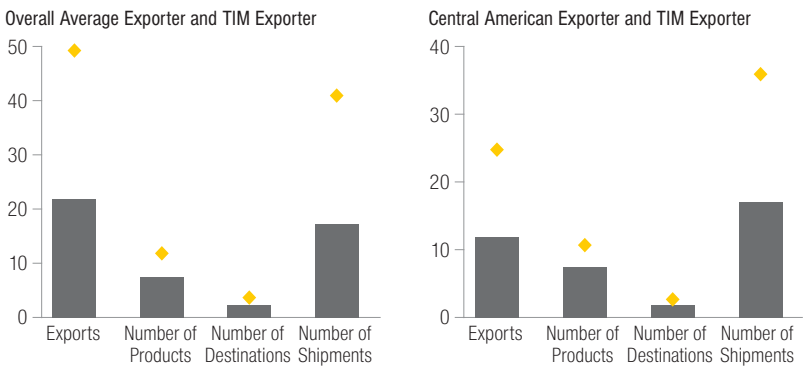


Source: Author's calculations based on data from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* - TIM) system.
Note: The upper panel shows aggregate export indicators (total export, number of exporters, number of products, number of destinations, and number of shipments) (left y axis) along with the respective percentage shares processed through the TIM (right y axis). The lower panel shows the same aggregate export indicators when destinations are limited to Central American countries (left y axis) along with the respective percentage share processed through the TIM (right y axis). TIM coverage is measured both considering flows to all relevant destinations (yellow line) and excluding the immediate neighboring countries, Honduras and Guatemala (orange line). Export values are expressed in increments of US$100 million, number of exporting firms in hundreds, number of products in hundreds, and number of destinations in increments of 10 (in this latter case, only in the upper panel).

percentage shares processed under the TIM (yellow and orange lines, right y axis), from 2010 to 2013. Exports grew 27 percent over the period to reach US$5.1 billion in 2013, 45 percent of which goes to the regional partners. Approximately 2,300 exporters made more than 400,000 shipments to sell 3,277 products to almost 9,300 buyers in 2013. Around 26 percent of the total export value and 28 percent of the export transactions were channeled through the TIM in 2013. These shares increase to 36.5 percent and 30 percent when only considering sales to other Central American countries and to around two-thirds when exports to immediate neighbors Honduras and Guatemala are excluded, which is a stricter measure of the actual use of the TIM and thus of its degree of implementation.

Figure 6.7 characterizes the average Salvadoran exporter in 2013 in terms of both total foreign sales and their road-based sales to Central American partners. On average, in 2013 exporting firms sold 7.5 products to six buyers in two countries for approximately US$2 million. In so doing, each of these firms made 173 annual shipments through two customs posts. Figures are similar for sales to the region, but the average total value is half (US$1 million). The average TIM exporter is generally larger than its respective counterpart along these dimensions. This points to

Figure 6.7 ■ El Salvador: Average Exporter, Average TIM Exporter, All Destinations and Central American Destinations, 2013



Source: Author's calculations based on data from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* – TIM) system.
Note: The left panel presents export outcomes for the overall average exporter (gray bars) along with those for the respective average TIM exporter (yellow diamonds). The right panel shows export outcomes for the average firm exporting to Central American countries (gray bars) along with those for the respective average TIM exporter (yellow diamonds). Export values are expressed in increments of US$100,000 and the number of shipments in increments of 10.

the importance of properly accounting for differences across firms when estimating the impact of the TIM on trade flows.

6.4 The Impact of a Streamlined Regional Transit Scheme on Exports: Evidence from El Salvador

6.4.1 Baseline: What Are the Effects of the Streamlined Regional Transit Scheme on Exports?

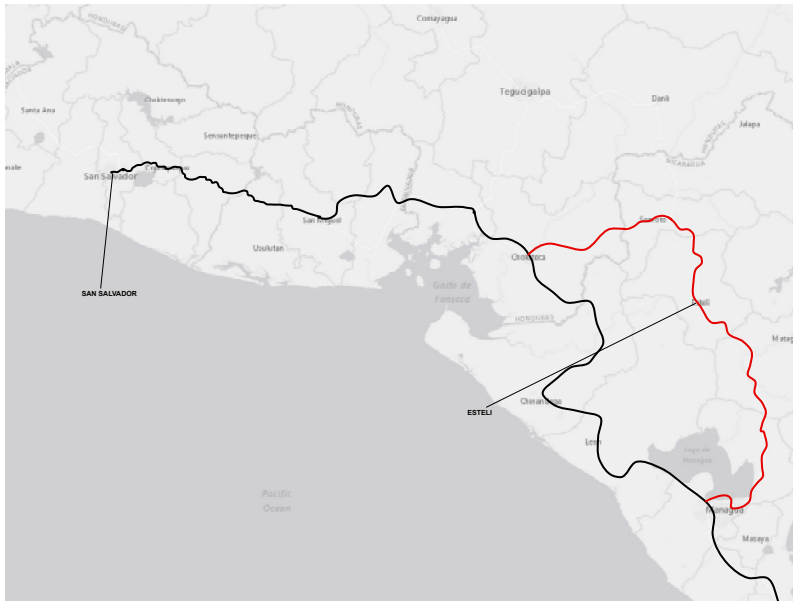
As explained in Section 6.3, the TIM was implemented sequentially in El Salvador. In the first phase, the country's customs agency established compulsory use of the TIM in all relevant trade routes connecting with regional partner countries that were covered by the scheme at that time. In other words, there was no explicit selection of corridors by Salvadoran customs authorities. In the second and third phases, coverage extended due to other countries joining the scheme or adding new trade corridors. These decisions can be considered exogenous to Salvadoran firms because they were taken by countries other than El Salvador and were non-origin-destination specific.

This stepwise implementation of the TIM generated variation in use of the regime both across export flows at a given point in time and over time. In particular, use of the TIM can vary both across firm-product-destination (-buyer) combinations in a given year and for these combinations over years. The reason is that firms can and do sell different products to different buyers located in different regions of a given destination, and these goods can be shipped through different routes. Take, for instance, a firm based in San Salvador that ships to a Nicaraguan buyer in Managua through El Amatillo and Guasaule but services a Nicaraguan buyer in Esteli through El Espino. In the first case, the firm could have started using the TIM as early as in 2011, but in the latter case the TIM only became an option in 2012 (Figure 6.8).[20]

This variation in transit procedures is used to estimate the impact of the TIM on firms' exports. In particular, the before-and-after TIM change in export flows processed through this simplified transit regime is compared with that in counterpart exports channeled under standard transit

[20] Alternatively, products with certain characteristics (e.g., time-sensitivity, fragility) might have to be transported on roads meeting certain criteria (e.g., quality of the surface, number of lanes, etc.).

Figure 6.8 ■ El Salvador: Gradual Phase-in of the Central American International Transit of Goods System across Trade Corridors: Two Specific Examples, San Salvador-Managua and San Salvador-Esteli

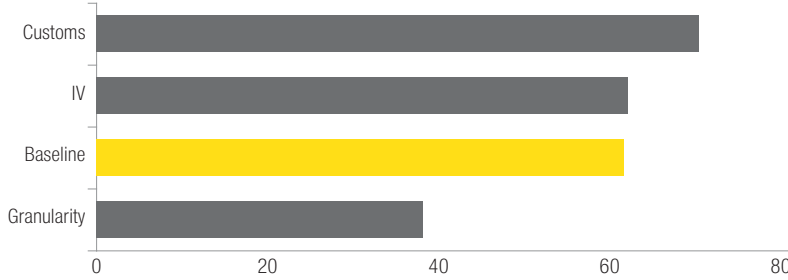


Source: Prepared by the author based on information from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* – TIM) system.
Note: The figure shows two trade corridors: San Salvador-Managua and San Salvador-Esteli. The trade corridor that started to operate with the TIM in 2011 is colored in black, whereas the trade corridor that started to operate with the TIM in 2012 is colored in red.

procedures. As with estimates reported in previous chapters, this comparison is conditional on controlling for time-varying firm and product-destination factors that may drive the use of the new transit scheme—to the extent that there was such a selection margin—and exports (e.g., firm size and changing abilities to comply with customs' and other border agencies' regulations, and product-specific trade costs associated with customs and other administrative procedures in the various destinations).[21]

[21] The baseline equation is estimated on data at the firm-product-destination-year level. The dependent variable is the change in (the natural logarithm of) the export value and the main explanatory variable is the change of a binary indicator that takes the value of one if the export flow was processed through the TIM and zero otherwise, along with firm-year and product-destination-year fixed effects. Standard errors are primarily clustered by main customs post-destination for inference purposes. It is worth mentioning

Figure 6.9 ■ El Salvador: Impact of the Central American International Transit of Goods on Firms' Exports, 2010–2013



Source: Author's calculations based on data from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* - TIM) system. Estimates presented in this figure are reported in Tables 3, 4, and 5 in Carballo, Graziano, Schaur, and Volpe Martincus (2016c).
Note: The figure shows the estimated percentage impact of the TIM on firms' export growth rates as obtained on the baseline sample and with the baseline estimation approach (Baseline), when weighting by the initial relative importance of export flows (Granularity), when estimating on data at the firm-product-destination-customs-year level and controlling for time-varying firm-product-destination and customs level factors (Customs), and when the TIM's availability in given trade corridors for specific exports is exploited to correct for potential firms' endogenous choice to use the scheme (IV).

Figure 6.9 presents this baseline estimated impact (yellow bar). According to this estimate, use of the TIM has been associated with 61.6 percent higher export growth. The sample median (logarithm) annual growth rate of firm-product-destination exports is 4.3 percent, so this would imply that, at the median, exports processed under the TIM would have a growth rate 2.7 percentage points higher than exports processed without changes in their administrative transit procedures.

This estimate cannot be automatically interpreted as informing the TIM impact on El Salvador's total exports. The reason is twofold. First, as mentioned previously, the distribution of export flows is typically characterized by a large majority of relatively small export flows. As a consequence, the estimated average impact reported above could be primarily capturing disproportionally higher growth rates of these flows in response to the TIM, which would not translate into sizable additional

that results reported herein are robust to use stricter sets of fixed effects (i.e., firm-product-year or firm-destination-year fixed effects along with product-destination-year fixed effects or firm-product-destination-year and buyer-year fixed effects when estimating on data at the firm-product-destination-buyer-year level) and alternative clustering of standard errors (e.g., standard errors clustered by main customs post, destinations, products, firms, and for the subsample for which data on firms' locations are available, by municipality of origin-main customs post-destination).

aggregate trade. When accounting for the initial relative importance of the export flows, the estimated effect of the TIM is smaller than the baseline but still economically important (bar labeled "Granularity").[22] In particular, with a weighted median growth rate of 1.2 percent, the estimates suggest that the new transit regime has raised foreign sales' growth by 0.5 percentage points.[23]

Second, the estimated impact can only be seen as informing net export gains for the country as a whole under the assumption of absence of cross-effects. However, this assumption might have been violated due to potential market stealing. More specifically, firms' exports processed under the TIM might have expanded partially or even entirely at the expense of counterparts' exports subject to the previous transit procedures.[24] Assuming that, if present, such negative cross-firm externalities are specific to foreign sales of given product-destination combinations, it is possible to informally carry out a number of estimations to assess whether this was the case.[25] Results from these indicative estimations do not detect significant redistribution effects and tend to support the conclusion that the TIM does seem to have resulted in additional foreign sales for El Salvador.[26]

As discussed above, the TIM was gradually implemented across trade routes as defined by origin-customs-importing country-specific

[22] The baseline equation is re-estimated by weighted least squares using the 2010 export values as weighting factors.

[23] The baseline estimating sample exclusively consists of continuing firm-product-destination exports. Given the pervasiveness of zeroes in international trade—especially at the firm-product-destination-year level—a variant of the baseline equation in which the dependent variable is the mid-point growth rate is also estimated. This specification makes it possible to incorporate appearing and disappearing firms' exports into the sample. These estimates also indicate that the TIM has had a positive effect on firms' exports.

[24] In such as case, the estimate would primarily correspond to the upper bound of the program's aggregate effect.

[25] The baseline equation is estimated based on alternative subsamples that involve comparisons between TIM exports ("treated") and their non-TIM counterparts in the same products to the same destinations ("untreated") and between the former ("treated") exports and those without changes in their transit conditions in other product-destination combinations ("residual").

[26] See Carballo, Graziano, Schaur, and Volpe Martincus (2016c). Moreover, the TIM might have directly affected the survival of similar exports not making use of this transit scheme. In order to investigate whether such crowding out took place, a linear probability model has been estimated on the sample of firm-product-destinations flows existing in 2010 for "untreated" and "residual" observations, whereby the dependent variable is a binary indicator taking the value of one if the export flow is present in 2011, 2012, or 2013

destination segments, so that usage of the system can vary across firm-product-customs-destination-year combinations. Figure 6.9 also reports the estimated impact of the TIM as obtained from data at this level while controlling for time-varying firm-product-destination-level and customs-level factors such as changes in the overall levels of efficiency of the different customs offices (bar labeled "Customs"). This estimated impact also suggests that the new transit scheme has positively affected firms' exports.[27]

Finally, whereas according to the normative the use of the TIM was mandatory, enforcement might have been imperfect, in which case firms may have purposely chosen to assign their best-performing exports to the streamlined transit procedures. If this was the case, the baseline estimated impact would overstate the TIM's true trade impact. This can be addressed by using the availability of the TIM in a given trade corridor for specific exports as a variable that only affects them by generating variation in actual use of the TIM and cannot be chosen by firms.[28] As shown in Figure 6.9, the resulting estimate is consistent with the baseline (bar labeled "IV").

6.4.2 Has the Streamlined Transit Scheme Been Cost-Effective?

A back-of-the-envelope calculation based on the "Granularity" estimate suggests that Salvadoran aggregate exports would have been roughly 6 percent smaller in the absence of the TIM.[29] On the cost side, the TIM involved both development and implementation costs and annual operational costs. The former amounted to approximately US$4.5 million and need to be prorated among the countries in the region according

and zero otherwise, and the main explanatory variable is a binary indicator that takes the value of one if there is at least an export flow with the TIM and zero otherwise (or their number), along with firm and product-destination fixed effects (as defined above). According to the estimation results, the TIM does not appear to have benefited some export flows at the expense of pushing others out of international markets.

[27] The TIM does not appear to have noticeably affected firms' modal or route decisions.

[28] The baseline equation is estimated by instrumental variables whereby the actual use of the TIM is instrumented with the availability of the associated streamlined transit procedures for firms located in a given municipality exporting a given product (through a given customs post) to a given destination in the year in question.

[29] This figure takes into account that the estimating sample does not include air-shipped exports. Only additional exports to Central America and Mexico are considered, since this is the primary area of application.

to their participation in the successive stages of the process.[30] The latter correspond to the overall compensation of officials supervising transits and inspecting the respective shipments at each customs office throughout the country. According to information kindly provided by El Salvador's DGA, there are 72 officials in charge of transport control with an average annual salary of US$8,500, 20 officials who perform nonintrusive inspections with an average annual salary of US$11,000, 24 officials who conduct thorough physical inspections with an average annual salary of US$16,000, and 37 customs managers with an average annual salary of US$20,000.

Given the aforementioned trade gains and TIM's prorated development and implementation costs and its annual operational costs, the implied benefit/cost ratio has been roughly US$40 per US$1 invested in the scheme.

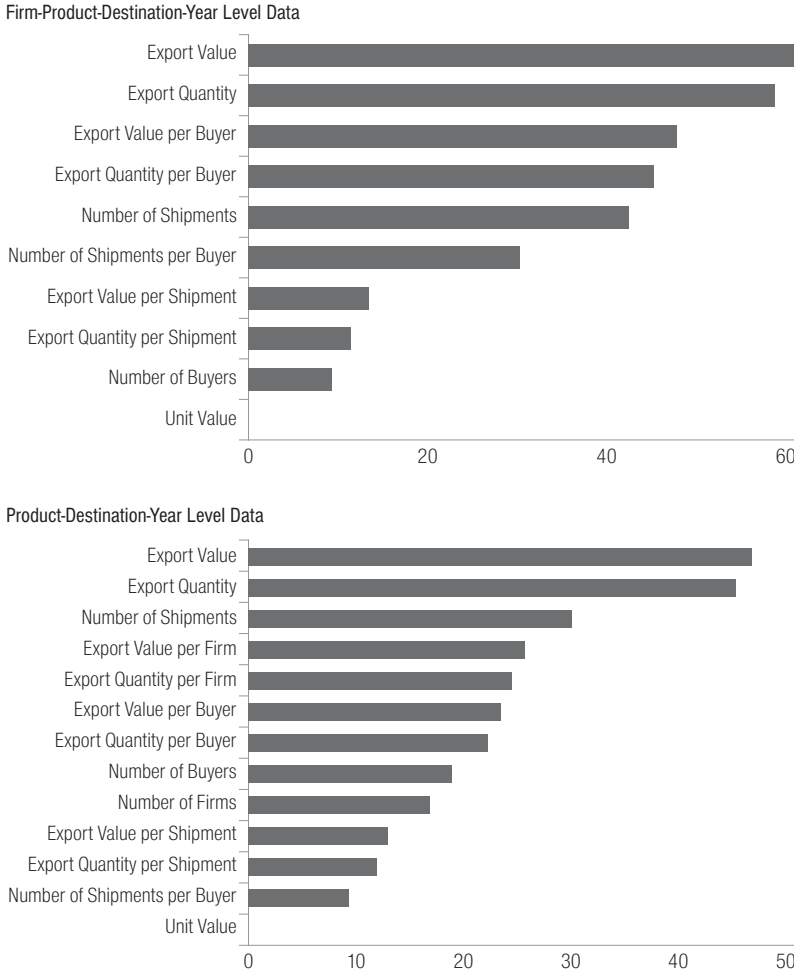
6.4.3 The Channels: How Does the Streamlined Transit Scheme Affect Exports?

To disentangle its channels, the effects of the TIM are estimated on the quantity (weight) shipped, unit values, number of shipments, average value and quantity per shipment, number of buyers, average value and quantity per buyer, and average number of shipments per buyer. Estimated effects are presented in the upper panel of Figure 6.10. They indicate that the new transit procedures have mainly affected the number of shipments and thereby the quantity shipped as well as the number of buyers and the number of shipments per buyer, and thus the average value and quantity of exports per buyer. Specifically, the TIM has been associated with a 42.5 percent increase in the growth rate of the number of shipments but with a substantially smaller increase in the growth rate of the size of the shipments in terms of value and quantities. In other words, the TIM seems to have led to an expansion of exports that primarily took place through higher shipping frequency.[31] On the other hand, the TIM does not appear to have influenced the unit values (free on board prices).

[30] This value should be taken as approximate. In particular, it should be viewed as a lower bound estimate of the actual development costs.

[31] This evidence based on a well-defined policy change complements findings reported in recent papers according to which shipments are an important margin of adjustment in

Figure 6.10 ■ El Salvador: Impact of the Central American International Transit of Goods System on Exports, Channels, 2010–2013



Source: Author's calculations based on data from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* –TIM) system. Estimates presented in this figure are reported in Table 8 in Carballo, Graziano, Schaur, and Volpe Martincus (2016c).

Note: The upper panel reports the estimated percentage impact of the TIM on the growth rate of firms' export value, quantity (weight), unit value, number of shipments, export value per shipment, export quantity per shipment, number of buyers, export value per buyer, export quantity per buyer, and number of shipments per buyer as obtained from data at the firm-product-destination-year level. The lower panel presents the estimated percentage impact of the TIM on the growth rate of export value, quantity (weight), unit value, number of shipments, export value per shipment, export quantity per shipment, number of buyers, export value per buyer, export quantity per buyer, number of shipments per buyers, number of firms, average export value per firm, and average export quantity per firm as obtained from data at the product-destination-year level. Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

Importantly, estimates reported in the lower panel of Figure 6.10, which are obtained from data at the product-destination level, reveal that streamlined transit procedures have had a significant positive impact on the firm extensive margin and thus seem to have helped new firms penetrate export markets (bar "Number of Firms").[32]

6.4.4 The Distributional Angle: Are the Export Effects of the Streamlined Transit Scheme Heterogeneous Across Firms, Products, and Destinations?[33]

The upper part of Figure 6.11 reveals that smaller firms have benefited slightly more than their large peers from the new transit system in terms of flows continuing between consecutive years (i.e., export-intensive margin).[34] Moreover, estimates shown in the lower part of Figure 6.11—which are obtained from data at the product-destination, firm-size, category-year level—suggest that the TIM's impact on entry into export markets has also been stronger for smaller firms (i.e., firm export extensive margin). Further along these lines, nonreported results from an assessment of the impact of improved transit procedures on the destination diversification of

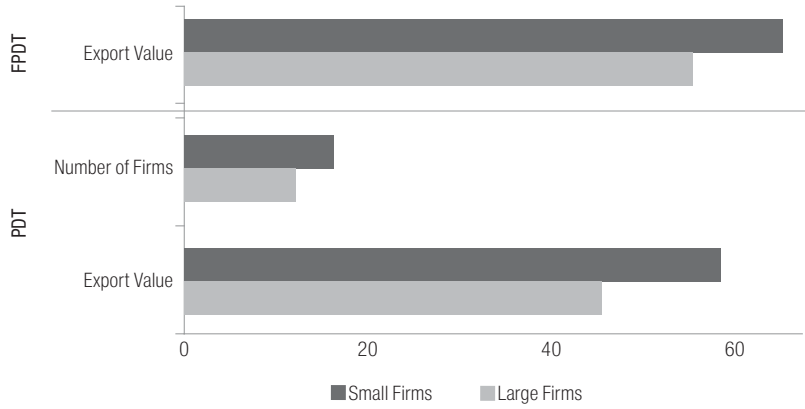
international trade (Kropf and Sauré 2014; Hornok and Koren 2015a). More precisely, Kropf and Sauré (2014) use Swiss data to estimate the magnitude of fixed-order costs similar to the findings of Alessandria, Kaboski, and Midrigan (2010). Hornok and Koren (2015a) estimate a gravity model to assess how fixed shipment costs affect order frequency and bilateral trade.

[32] These estimates are obtained by estimating a modified version of the baseline equation at the product-destination-year level in which the main dependent variable is the change in (the natural logarithm of) the number of firms registering exports in the product-destination in question and the main explanatory variable is change in the TIM indicator at this level, along with product-year and destination-year fixed effects. It is also worth noting that, by aggregating away the firm dimension, these estimates are less subject not only to the self-selection problems discussed above but also to the granularity issue.

[33] As in previous chapters, heterogeneous effects are estimated by modifying the baseline equation to allow for different effects across relevant groups through interactions between the trade facilitation policy indicator (in this case, the TIM) and binary indicators identifying these groups. The nonconditional effects are captured by the fixed effects included in the equation.

[34] Small exporters are firms with up to 200 employees and large exporters are firms whose number of employees is above this threshold. Results are similar if alternative thresholds are used to distinguish between small and large firms (i.e., 50 or 100 employees) or the condition that small and large firms export in the same product-destination combinations is imposed. Employment data come from the 2011 national economic census.

Figure 6.11 ■ El Salvador: Impact of the Central American International Transit of Goods System on Exports, by Firm Groups, 2010–2013



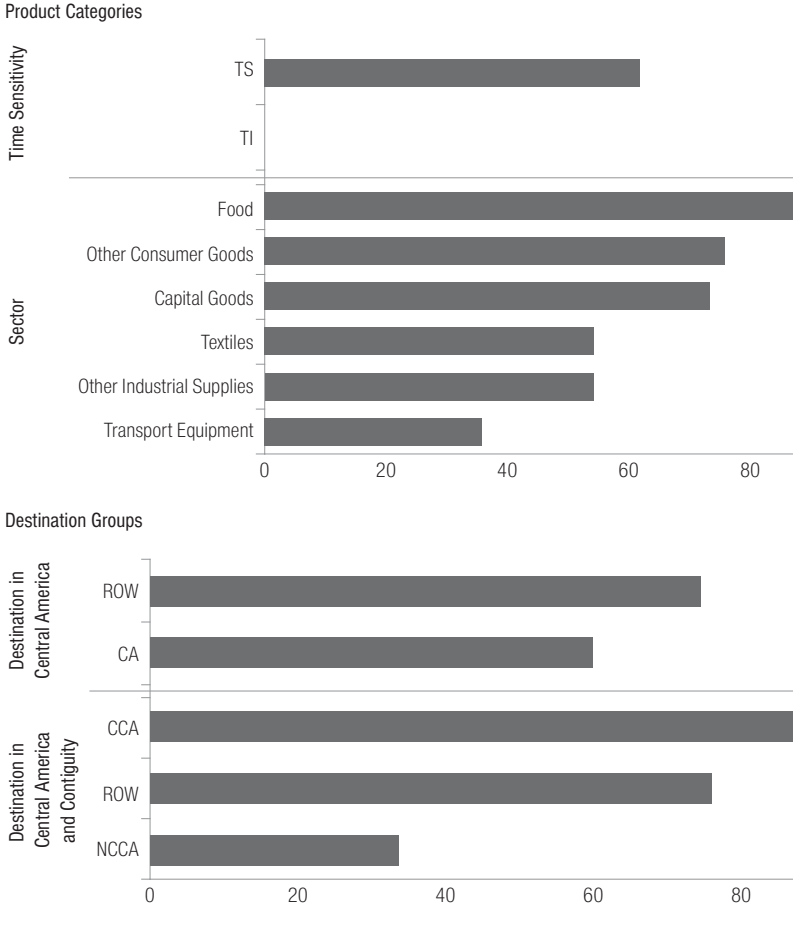
Source: Author's calculations based on data from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* - TIM) system. Estimates presented in this figure are reported in Table 9 in Carballo, Graziano, Schaur, and Volpe Martincus (2016c).
Note: The figure shows the estimated percentage impact of the TIM on firms' export growth rates for small firms (i.e., firms with up to 200 employees) and large firms (i.e., firms with more than 200 employees) as obtained from data at the firm-product-destination-year level (FPDT) (upper row pair) and on the number of exporting firms and the export values for both kinds of firms as obtained from data at the product-destination-firm size category-year level (PDT) (lower row pairs).

exports of given products from firms in these two different size categories indicates that the implied reduced transit times have had a significant positive effect on the destination extensive margin and this effect seems to have been larger for smaller companies.[35] In short, the TIM appears to have helped firms in general and small ones in particular expand their existing export flows and reach new export markets.[36]

[35] A variant of the baseline equation is estimated whereby the dependent variable is the change in a binary indicator that takes the value of one if a firm-product-destination flow is present in a given year and zero otherwise, and the main explanatory variable is the change in the TIM status indicator between two consecutive years on the sample of all firm-product-destination triples that did not register exports in 2010 conditional on the firms exporting the products in question to at least one destination (i.e., on the respective firm-product pair being positive). In addition, the effects of the TIM are allowed to differ for small and large firms.

[36] Given the logic of the transit system, and to be parsimonious and consistent with estimations aimed at uncovering potential heterogeneous effects across countries, singled-out destinations are the individual Central American countries and the rest of the world as such.

Figure 6.12 ■ El Salvador: Impact of the Central American International Transit of Goods System on Firms' Exports, by Product and Destination Groups, 2010–2013



Source: Author's calculations based on data from El Salvador's customs agency (*Dirección General de Aduana* – DGA) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* – TIM) system. Estimates presented in this figure are reported in Tables 10 and 12 in Carballo, Graziano, Schaur, and Volpe Martincus (2016c).
Note: The upper panel reports the estimated percentage impact of the TIM on firms' export growth rates of time-sensitive products (TS) and time-insensitive products (TI) as classified based on the estimation results reported in Hummels and Schaur (2013) (upper part), and of different product categories, i.e., food products, textile products, other consumer goods, capital goods, other industrial supplies, and transport equipment) (lower part). The lower panel presents the estimated percentage impact of the TIM on firms' export growth rates to different destinations, i.e., Central America (CA) and the rest of the world (RW) (upper part) and contiguous Central American countries (CCA), non-contiguous Central American countries (NCCA), and the rest of the world (ROW). Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

There are heterogeneous effects from the TIM across products (upper panel of Figure 6.12). In particular, the positive effects of reduced transit times are stronger on sales of time-sensitive goods.[37] This is particularly the case with food products, and other consumer goods and capital goods.[38] As for destinations, evidence presented in Figure 6.12 suggests that the positive response of foreign sales to shorter transit processing times does not significantly depend on the final destination, either within or outside of the region. Within Central America, effects tend to be stronger for closer destinations. A possible explanation could be that time savings associated with the new transit regime are larger relative to the respective total time spent in reaching the market for these destinations.[39]

6.5 External Validity: Are the Export Effects of the Streamlined Transit Scheme Exclusive to El Salvador? Evidence from Guatemala

Estimation results consistently indicate that the TIM has had a significant positive impact on Salvadoran firms' exports. It is possible, though, that the effects, if any at all, could have been different in other participating economies. In order to address this concern regarding the external validity of the findings reported so far, the experience of another country with the new transit regime, Guatemala, is examined (Figure 6.13). In this country, the TIM started with a pilot project in 2008 and has also been implemented gradually over the successive years. The analysis is carried out using export transaction-level data comparable to those for El Salvador over 2007–2013 that have been kindly provided by the Guatemalan Tax Administration

[37] Time-sensitivity is defined using the estimation results from Hummels and Schaur (2013), who identify the cost of lengthy delays based on firms' choices of air versus ocean shipment. In particular, the estimated effect of shipping times on the share of air relative to ocean shipments is used. More specifically, goods are classified as time-sensitive if the estimated coefficient on shipping time (i.e., days/rate ratio) of the respective HS 2-digit product is positive and significant.

[38] Nonreported estimation results further reveal that the impact is largest on small firms' exports of time-sensitive products. The second largest effect is observed on large firms' exports of the same type of goods. It is worth pointing out that the effects of the TIM across product categories again work mostly through an increase in the shipping frequency.

[39] Results are the same if a common set of products is imposed across different groups of destinations.

Figure 6.13 ■ Guatemala: Impact of the Central American International Transit of Goods System on Firms' Exports, 2007–2013

Source: Author's calculations based on data from the Guatemalan Tax Administration Agency (*Superintendencia de Administración Tributaria* - SAT) and the Central American International Transit of Goods (*Tránsito Internacional de Mercancías* - TIM) system. Estimates presented in this figure are reported in Table 7 in Carballo, Graziano, Schaur, and Volpe Martincus (2016c).
Note: The figure shows the estimated percentage impact of the TIM on the growth rate of firms' export value, quantity (weight), unit value, number of shipments, export value per shipment, export quantity per shipment, number of buyers, export value per buyer, export quantity per buyer, and number of shipments per buyer. Estimated effects that are not statistically significantly different from zero at the 10 percent level are reported as zero.

Agency (*Superintendencia de Administración Tributaria* – SAT), and the respective transit data from the TIM database.[40] These results are fully in line with those for El Salvador. They indicate that the TIM has also positively affected exports from Guatemalan firms. Interestingly, as in El Salvador, shipping frequency is the main channel though which exports expanded as a consequence of the TIM in Guatemala.

6.6 Summary and Conclusions

This chapter has examined the implications of harmonizing, streamlining, integrating, and computerizing processing and clearance procedures for cross-border shipments that are carried across third countries using the Central American International Transit of Goods system as a case study.

[40] Each customs record includes a firm's identification number, the product code (HS 8-digit), the destination country, the foreign buyer, the export value in U.S. dollars, and the quantity (weight).

While the TIM certainly still has significant room for improvement, the results show that the simplified border procedures actually facilitated trade: exports processed under the new transit system grew faster than their counterpart exports subject to regular transit procedures. The trade-increasing effect can be mainly traced back to higher shipping frequency. This implies that regional transit regimes can only reach their full potential if public infrastructure such as roads that can handle the associated increase in shipping frequency is available.

Furthermore, not everybody gains equally from upgraded transit regimes. Streamlined transit procedures seem to have influenced export specialization. Their impact has been larger on foreign sales of time-sensitive (and differentiated) goods. Improved transit may therefore be particularly helpful for countries that trade intermediate inputs and products with short selling seasons, fast depreciation due to spoilage or changing tastes, or for which demand is difficult to predict and shippers need a flexible system that allows them to respond fast to changing market conditions.[41] Moreover, the effects of the TIM appear to be asymmetric across regional destinations.

These results, which are generally consistent for the two exporting countries covered in the analysis (El Salvador and Guatemala), provide valuable insights to peers specializing in different products according to their comparative advantage and trading with different partners so that they can evaluate the potential benefits of improving their transit trade regimes.

This is particularly relevant for countries such as Colombia and Ecuador, which recently adopted the TIM on a pilot basis for bilateral trade and are considering fully implementing it, and for Bolivia and Peru, which are evaluating the possibility of following these steps. Further, member countries of the Southern Cone Common Market (MERCOSUR) (Argentina, Brazil, Paraguay, and Uruguay) and associated countries (Chile and Bolivia) have a different system, the Customs International Transit Information System (*Sistema Informático de Tránsito Internacional Aduanero* - SINTIA). This system, which also incorporates information and communication technology to record and process transit documentation, has been phased in on a gradual bilateral basis starting with a series of pilots between Argentina and Uruguay in 2009.

[41] See Evans and Harrigan (2005) and Hummels and Schaur (2010).

Systems such as the TIM and the SINTIA should be fully integrated with those of their respective customs and other border agencies both to minimize the risks and negative effects associated with data compartmentalization and to maximize well-organized data for systematic analysis and control. From the point of view of trade facilitation at a broader regional level, the systems should use compatible guiding operative principles, include similar functionalities (i.e., automated processing and real-time exchange of data based on single comparable digitized forms and unified border controls with single window logic encompassing all border agencies), and be interoperable. This is especially important for countries that are at the edge of different subregions such as Bolivia (i.e., Andean Community of Nations and MERCOSUR).

>> What's Next? Towards a More Comprehensive and Internationally Consistent Trade Facilitation Framework 7

For trade, time is of the essence, especially in a context characterized by relatively low tariffs and supply chains that heavily involve border crossings. The effectiveness of public entities that have an impact on border times and thereby on the time required to connect origins and destinations thus becomes critical. This is the case with customs and other relevant border agencies. How their trade-related regulations are designed and enforced and what their associated procedures and means to complete them are determine the "thickness" of borders and how much time is required to cross them. Trade facilitation policies aim to streamline these processes and speed up the movement of goods across borders.

From a policy perspective, a first natural question that arises is how to properly measure countries' progress towards facilitating trade and assess the implied economic impact. To date, the standard practice has been to use survey-based, country-level measures of the total time to export and import (or some of its components). The results of the analysis presented in Chapter 1 clearly suggest that diagnosis and evaluation of policies should ideally make extensive use of the wealth of high-frequency, real-time data generated by border agencies' information systems in most countries around the world. These data allow the entire universe of shipments to be tracked throughout the entry and exit processes, breaking

down the associated border times into the relevant steps, and specifically distinguishing between those steps more directly attributable to public intervention (such as port handling and customs processing) and those that are more strongly influenced by firms' behavior. Thus, these data make it easier to detect the real bottlenecks. Also important, these data help uncover relevant heterogeneities by firm-related, product-related, and destination/origin-related factors, among others. More precisely, Chapter 1 proposed measuring border times and estimating their impact on trade flows based on actual processing times computed as the sum of port, customs, and other border agency times reported in micro data from border agencies.

Note that these times and their effects can systematically differ across firms and product-destination and product-origin combinations. As a consequence, they can vary across countries even when the rules governing the trade process are exactly the same due to potential differences in the composition of the population of trading firms, sectors, and partners. This is why it is important to net out the role of these factors and explore asymmetries using micro data. Further, in order to avoid misrepresenting their effects on trade, it is crucial to account for the fact that, even after isolating the aforementioned factors, border times may respond to firms' decisions. In other words, forces that induce changes in these times but otherwise do not directly affect trade need to be found and exploited to quantify the impact of interest.

In recent years many Latin American countries have rolled out various trade facilitation initiatives, often with technical and financial support from the Inter-American Development Bank and other national or international organizations (Table 7.1).

These initiatives include the introduction of risk management systems, authorized economic operator programs, simplified postal export regimes, electronic single window arrangements, and streamlined transit schemes, among others. Each of these initiatives in general, and their trade impact in particular, has been thoroughly examined through detailed case studies in respective dedicated chapters (Chapters 2 to 6). Three main messages come out of these empirical examinations. First, these measures have been generally effective in facilitating trade: exports and imports expanded as a consequence of their implementation. Second, the main channel through which this trade expansion has taken place has consistently been an increase in shipping frequency. Given that crossing

Table 7.1 ■ Latin America and the Caribbean: General Support and Support for Specific Trade Facilitation Initiatives from International Donors, 2016

Organization	AEO	T/CB	CBM	D/CA	IT	RM	SW	SF	Transit
IDB	21	33	19	12	12	10	24	5	6
IMF	0	2	5	4	0	12	0	5	0
WCO	5	0	3	3	5	11	3	2	0
OAS	5	0	0	0	0	0	0	0	0
CBP/USA	4	15	11	11	9	1	0	0	0
AEAT/Spain	2	5	0	0	0	0	0	0	0
Japan Customs	1	1	2	0	1	9	0	1	0

Source: Corcuera-Santamaría (2016).
Note: The table reports the number of countries that each donor supports in the following areas: AEO: authorized economic operators; T/CB: training and capacity-building; CBM: coordinated border management; D/CA: Diagnosis or comprehensive assessment; IT: information technology; RM: risk management; SW: single window; SF: strategic framework; and Transit: transit systems. The organizations listed include the IDB: Inter-American Development Bank; IMF: International Monetary Fund; WCO: World Customs Organization; OAS: Organization of American States; CBP/USA: U.S. Customs and Border Protection; and AEAT/Spain: Spain's Customs/Tax Agency.

borders has now become easier and faster, firms have greater flexibility to better respond just-in-time to consumers' demands and match their preferred delivery times, as well as to source inputs to use in their production processes or goods to sell in the domestic market. Interestingly, this seems to have been associated with an enlargement of the buyer/supplier bases. Third, facilitation appears to have generated trade gains that are asymmetric across firms, products, and destinations/origins, and hence can affect specialization patterns. As expected, trade in time-sensitive products has grown the most. Moreover, while both small and large firms have benefited from these initiatives by scaling up their existing trading relationships, the former appear to also have taken advantage of the procedural simplification to venture into foreign markets. Further, new-to-trade firms are clear winners. As for destinations and origins, effects tend to be larger for OECD countries.

Despite this progress and the observed positive impact, there is significant room to improve and to extend what has been already accomplished. In short, much remains to be done along both the intensive and extensive margins of trade facilitation policymaking.

Previous chapters have shown that these various trade facilitation initiatives are logically connected. Thus, AEO programs are primarily operationalized through a modification in the certified firms' risk profiles in customs risk management systems, which translates into a lower average probability that the firms' shipments are physically inspected. More generally, risk management should be consistently applied across all border agencies in the framework of actual true single windows, which should have international transit as one of their components and should be internationally interoperable to allow one-stop control at each bilateral border through which shipments transit.

However, in several cases, specific trade facilitation schemes have cumulatively developed over time as separated, unarticulated modules that often use different information technology solutions. From an architectural point of view, that is equivalent to building a house with a foundation that can only accommodate one floor and later realizing that a second floor and possibly an addition are needed. More precisely, natural network externalities in the incorporation of these information technology solutions—whereby benefits from an agency using one of these solutions depends on the number of counterparts using a compatible technological solution—have not been fully considered.[1] Thus, this situation shrinks the extent of actual facilitation, as firms have to deal with disparate systems, and hinders full systematic exploitation of the data produced by these systems to better design procedures and target delay-creating controls. It can also make it harder to overcome such fractioning due to endogenously generated political resistance and financial and technological obstacles (e.g., agencies that already invested resources in adopting a particular system may be reluctant to interact with peers if this implies using a different, costly technology). Telling examples in this regard are the lack of full automated integration of customs' and other border agencies' information systems and between those recording regular trade and international transit transactions.

Thus, the first challenge that Latin American and Caribbean countries face to get the most out of the trade facilitation policy agenda—with the WTO Trade Facilitation Agreement providing a unique opportunity to implement it—is to develop an overarching view and adopt a consistent

[1] See Katz and Shapiro (1986).

operative approach to articulate these various initiatives both within and across countries.[2] This should materialize into smart process reengineering and adequate operating conditions that take full advantage of the possibilities opened up by emerging information technology and big data. This strategy accordingly involves three main pillars: process reshaping, improved operation, and more and better technology introduction. Thus, as demonstrated by Costa Rica's experience in adopting its electronic single window, computerization works well if administrative procedures and workflow function well. Poorly designed procedures will not become mechanically streamlined and result in expedited processing of shipments via the mere incorporation of information technology. In other words, the border labyrinth will not substantially narrow by simply using a GPS to navigate it. The situation will only improve if systems are also redesigned according to an enhanced master plan.

Similarly, the trade processing scheme is in fact as fast as its slowest relevant (nonautomated) component. If 24/7 operation is not consistently guaranteed, processing times will be those of the agencies with the most limited working times. The same holds for other determinants of agencies' effectiveness and implied border times, such as available financial resources and the level and qualification of personnel.

Finally, thanks to progress with information technology, the scope to replace cumbersome and time-consuming management of printed forms and to streamline trade-related procedures is larger than ever. Today, common standards that enable interfacing are required to assure that the different pieces of the trade processing machinery can be combined and work well with each other to produce the best results. In particular, easing repetitive administrative procedures, reducing unnecessary delays, and establishing greater flexibility can only be achieved by using virtual systems that handle vast amounts of data and are capable of "talking" to each other.

These pillars translate into the series of specific lines of action that follow.

- *Better border coordination for both trade and transit*: Countries should design and collaborate with each other on designing more effective border

[2] Estevadeordal and Talvi (2016) also stress the importance of linking trade facilitation programs across countries to deepen their integration.

procedures, further moving towards virtual mechanisms interconnecting all relevant public agencies and private sector providers to process converging and ideally common digitized trade forms and documents (i.e., permits, certificates, load manifests, and even declarations) and increased automation that allows 24/7 operation.[3] This would create the conditions for comprehensive electronic single windows that could be linked across countries and, as a result, integrated one-stop border controls. Such arrangements, which could operate using cloud-based solutions such as the Internet of Things (as done, for example, by the Port of Hamburg), would make trade in general and overland trade and international transit in particular more seamless.

- *Stronger risk management:* Consistent with the framework defined above, countries should adopt an integral risk approach involving all border agencies. Coupled with more effective use of the growing wealth of data through more sophisticated econometric tools, this would allow countries to better analyze trade flows and actors and more successfully detect suspicious operations.[4]
- *Expanded Authorized Economic Operator programs:* In the same vein, countries should go beyond customs and include other border-regulating agencies in their AEO programs. At the same time, these agencies should work more closely with the private sector to exchange real-time information and connect these programs with those of their peers in other countries through Mutual Recognition Agreements to speed up trade operations involving trustworthy operators on both sides of borders.

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[3] For instance, the United States and Mexico have adopted a common electronic load manifest. As expected, there are fields that are of interest for only one of the partners. These are only shown by the system to the country in question.

[4] Customs agencies use information on foreign suppliers to assign import shipments to the different verification channels. However, this information is not systematized. In particular, the respective field is open and not codified and the data are not necessarily consistently inputted. Properly exploiting these data for risk management purposes first requires making them homogenous. In this sense, the utilization of common codes for firms would be worth considering (e.g., combining countries' International Organization for Standardization codes and alpha-numeric firm identifiers based on their tax identification number). This would substantially facilitate efforts to detect irregular trade flows between countries and, more generally, develop joint intelligence and risk management schemes. Needless to say, such an initiative requires a substantial level of cooperation between countries' border agencies.

- *Removal of specific barriers to e-commerce and services trade*: Latin American and Caribbean countries still have to seize the opportunities that these dynamic trade modalities can bring. Moving in this direction requires proper regulations and procedures for postal and express shipments, as well as for data flows, among other things. Fluid data flows are crucial for developments such as 3D printing, whereby designs placed in the cloud can be directly printed at the destination without an actual physical exchange of goods taking place, thus helping decongest border and other agencies' facilities therein.[5]
- *Built-in impact evaluation, benchmarking, and surveys*: In fine-tuning and adapting these trade facilitation programs to changing conditions and evolving technologies, countries need to regularly assess their effectiveness through periodic impact evaluations as feasible. Other core ingredients of these programs' adjustment processes include benchmarking exercises to remain up-to-date on peers' good practices that could be adapted to local conditions and thus adopted, surveys and, more generally, other mechanisms to gather the private sector's critical inputs.
- *Consideration of broader policy interactions*: It is crucial to factor in the interplay between trade facilitation policies and policies in other areas. Thus, as shown throughout the report, increased shipping frequency is the primary channel through which trade facilitation appears to have affected exports and imports. This imposes a demand on physical transportation infrastructure. The full trade-creating potential of facilitation can then only be realized if this infrastructure is prepared to accommodate the more intense traffic to and from countries' borders. Furthermore, Chapter 2 pointed out that, by design, risk management systems tend to target new trade relationships typically involving new-to-trade firms. Those firms might include a nontrivial portion of relatively young, tax- and social-security-compliant firms with high growth prospects that have made use of the services provided by trade promotion agencies. This calls for coordination between the interventions of relevant agencies to minimize interference of actions to guarantee normative compliance and security with public programs to expand the base of trading firms and diversify trade. Similarly, the effectiveness of investment

[5] See Suominen (2016).

> promotion policies will be strongly conditioned by the extent to which local trade regulations and procedures facilitate trade. In particular, for given levels of services and incentives provided by investment promotion agencies, the likelihood of succeeding in attracting affiliates of multinational companies and participating in global value chains can be expected to be lower if crossing borders is difficult and takes a long time. The reason is that this can severely disturb firms' production processes and their ability to supply markets on time, potentially generating costs that are far larger than the benefits associated with the location in question.

The measures outlined above imply two-sided reductions in trade costs as opposed to the unilateral efforts that have been typically made to date. These measures are likely to yield substantial trade, productivity, and employment gains, especially if they are combined with investments to modernize the region's infrastructure and with proper coordination with other relevant policies such as those to promote exports, investments, and even innovation. On the other hand, delaying or mishandling implementation of these measures would ultimately reduce the role of Latin America and the Caribbean in the global economy. Countries face clear choices and must make decisions before it is too late.

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This report on Integration and Trade in Latin America and the Caribbean methodically dissects, with a surgeon precision rate, the intricate relationship between border agencies along the supply chain and provides a new insight on the positive impact of various initiatives geared towards facilitating trade and reducing trade times. The astute use of transaction-level data enlightens the reader on the actual consequences of the trade facilitation policies and the econometric examinations provides fresh perspectives on the influence of border agencies' strategies and firms' trade decisions on countries' international trade. This publication underscores WCO's tools and programs to facilitate trade such as the Time Release Study, the Authorized Economic Operators, and SAFE Framework of Standards. While border environment is indeed complex with various actors and different influences, the findings of this report provide a Daedalus thread to decision makers to get out of the Labyrinth.

Kunio Mikuriya, Secretary General, World Customs Organization

Out of the Border Labyrinth provides important analysis on the steps and time necessary to get goods across borders and will contribute to a better understanding of how Latin American and Caribbean countries can implement the vision of the World Trade Organization's Trade Facilitation Agreement. The well-crafted economic assessments and insightful case studies will serve as a useful guide to addressing the myriad of challenges of aligning these steps and reducing times to ensure that businesses and consumers benefit from reducing unnecessary border costs.

Robert Koopman, Chief Economist and Director of the Economic Research and Statistics Division, World Trade Organization

Modern trade moves fast -- on airplanes, across borderless customs zones, in a tightly choreographed dance of logistics. Countries with antiquated and labyrinthic systems for processing goods flows are increasingly excluded from sharing in the benefits of that trade. This volume carefully documents the time costs associated with crossing LAC borders, details the causes of those delays and their effect on trade volumes as well as firms' strategic responses to them. But it is at its best in describing how a new set of policies focused on facilitating trade (risk management, trusted operators, single window systems) offer a path out of the labyrinth, and into closer integration with the world economy.

David Hummels, Dean and Professor of Economics, Purdue University

Reaping tangible benefits from trade is fundamental in a world characterized by protectionist pressures, slow export growth and the need to reignite growth engines. This IDB publication provides an excellent and thorough overview, including impact evaluation of several programs to facilitate trade, based on micro data at the firm level, expanding the toolbox for further applied research. The trade facilitation schemes evaluated in this book will enable policymakers to boost intraregional trade, internationalize SMEs and enable their participation in global value chains, priorities set in fora such as APEC or Pacific Alliance.

Luis Miguel Castilla, Peru's former Ambassador to the U.S. and former Ministry of Economy and Finance

978-1-59782-271-8

ISBN: 978-1-59782-271-8

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