IDB WORKING PAPER SERIES Nº IDB-WP-01131

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Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Online business platforms and international trade / Jerónimo Carballo, Marisol Rodriguez Chatruc, Catalina Salas Santa, Christian Volpe Martincus.
p. cm. — (IDB Working Paper Series ; 1131)
Includes bibliographic references.
1. Electronic commerce-Peru-Econometric models. 2. International trade-Technological innovations-Econometric models. 3. Exports-Peru-Econometric models. I. Carballo, Jerónimo. II. Rodriguez Chatruc, Marisol. III. Salas Santa, Catalina. IV. Volpe Martincus, Christian. V. Inter-American Development Bank. Integration and Trade Sector. VI. Series.
IDB-WP-1131

Key words: Information Frictions, Online Platforms, Exports, Firms
JEL Codes: F10, F13, F14, D83, L15, L86

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This version: June 2020

Abstract

International trade is subject to information incompleteness. Firms must therefore engage in a costly search process to find business partners. Online platforms can reduce these search costs and thereby favor firms' exports. We examine whether this is actually the case and the underlying mechanisms thereof by focusing on *ConnectAmericas*, a free, purely informational online platform that, by the end of 2018, connected more than 45,000 firms from 140 countries. In particular, we estimate the impact of using the platform on firms' foreign sales utilizing detailed data on both firms' participation therein and the entire universe of export transactions for Peru over the period 2010-2018. In so doing, we apply a difference-in-differences strategy and specifically exploit visits firms received to their profiles as a source of identifying variation. Consistent with the interpretation of the platform as a search cost-reducing mechanism, our estimates suggest that *ConnectAmericas* resulted in increased firms' exports, particularly from those that had no digital presence, of differentiated products, and to less familiar destinations.

Keywords: Information Frictions, Online Platforms, Exports, Firms
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* We would like to thank Cynthia Aliaga, Juan Carlos Cervantes, Carlos Díaz, Francisco Estrázulas de Souza, Santiago Ferrari, César Freund, July Jimenez Orjuela, Edal Luján, Reynaldo Torres Ocampo, and Manuela Vásquez Ochoa for generously helping us build the dataset used in this paper; Maggie Chen, Jonathan Eaton, Holger Goerg, Kala Krishna, Gisela Rua, Pablo Sanguinetti, Peter Schott, and participants at various seminars and conferences for insightful and useful suggestions; and Adam Pfander for excellent editing assistance. The views and interpretations in this paper are strictly those of the authors and should not be attributed to the Inter-American Development Bank, its executive directors, its member countries, SUNAT, or PROMPERU. Other usual disclaimers also apply.
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1. Introduction

Information is often incomplete.[1] This is especially the case in international trade. Firms that trade across borders must engage in a search process to acquire information about prevailing conditions in foreign markets and specifically to find and assess potential business partners (see Allen, 2014; and Rangan and Lawrence, 1999).[2] Evidence suggests that search costs are large.[3] For instance, these costs have been found to be more than US$ 50,000 for non-exporting firms wishing to ensure one potential client per year and to account for more than 90% of the empirical gravity relationship between trade flows and shipping distance (see Eaton et al., 2014; Allen, 2014). Firms consistently report that identifying the initial business contact and establishing the initial dialogue with prospective partners are perceived as major trade barriers.[4] This is particularly important for developing countries, where access to information technologies is limited and whose firms are overwhelmingly small (see Startz, 2018).[5]

In this paper, we examine whether, to what extent, and how the introduction of an online business platform that increases firm visibility can reduce search costs and thus affect exports. In doing so, we exploit detailed data on firms' use of the platform along with transaction-level customs data for the entire universe of a developing country's exporters. We thereby contribute to various literatures, including those on information frictions as determinants of international trade and on the role of technologies as mechanisms to reduce those frictions.

The world is experiencing a wave of technological changes. A major expression of these changes is the rise of the digital economy. This economy is expanding rapidly. For example, in the United States, the digital economy grew, on average, more than three times faster than the overall economy over the period 2006-2016 (see BEA, 2018). As preliminary evidence suggests, this trend will further accelerate as a result of the COVID-19 pandemic (see, e.g., CCI, 2020; Zhang and Yi, 2020).

Importantly, from an economic point of view, digitalization is substantially affecting the way firms interact among each other and with consumers. An increasing share of these interactions is taking place via online platforms (see UNCTAD, 2019). More precisely, these platforms connect different sides of markets. In their transactional variants,

[1] See Stigler (1961) for a pioneer work on the economics of information.

[2] See also, e.g., Johanson and Vahlne (1977); and Leonidou and Theodosiu (2004).

[3] Anderson and van Wincoop (2004) show that information frictions are an important obstacle to trade. These frictions help explain why national borders impede trade and grow larger as distance increases and familiarity decreases (see, e.g., Grossman, 1998; Head and Mayer, 2003; and Huang, 2007).

[4] See, e.g., Kneller and Pisu (2011) and WTO (2016).

[5] These firms do not have an identifiable brand name and their reputation largely depends on the perceptions on their home countries, which are typically seen as producers of poorer quality goods (see, e.g., Chiang and Masson, 1988; Egan and Moody, 1992; Chisik, 2003; and Hudson and Jones, 2003).

they allow for exchanges between the respective parties and typically encompass the payment and logistic solutions to materialize these exchanges (i.e., payment processing and delivery arrangements). This is the case with well-known e-commerce platforms such as *Amazon*, *Alibaba*, *eBay*, or *Mercado Libre*. Net sales of these firms have been growing at a fast pace in recent years. For example, *Amazon*'s net sales registered a threefold increase since 2013 to reach US$ 233 billion in 2018 (see Amazon, 2015 and 2019). Taken together, sales in these platforms account for 36% of the GDP in major economies.[6] Remarkably, around 90% of these sales correspond to business-to-business (B2B) transactions and increasingly larger shares of these transactions are cross-border (see UNCTAD, 2019). For instance, around 30% of *Amazon*'s net sales are international (see WTO, 2018).

These platforms therefore represent laboratories to investigate whether and, if so, how digitalization affects international trade by transforming the way firms interact with each other. More specifically, they provide an ideal setting to study the effects of reductions in search frictions on firms' trade. This endeavor, however, faces two major challenges. First, platforms facilitate both matchmaking, as they reduce search costs for exporters and importers, and actual transactions, as they also lower non-informational payment and logistic costs. These costs are different in nature and have different research and policy implications (see Allen, 2014).

Second, the identity of parties is largely unknown, which complicates the identification of the impact of interest. In particular, it is difficult to establish: (i) who is participating and who is not participating; (ii) whether participants are firms or consumers and even less their types –unless *ad hoc* working assumptions are made; (iii) the whole picture of their trade and business activities both inside and outside of the platform (see, e.g., Lendle and Vezina, 2015; Lendle et al., 2016). Distinguishing between participants and non-participants in the platforms and knowing their overall export performance is crucial to determine (i) whether and to what extent these platforms create trade both for the firms and the country –as opposed to merely lead to a substitution between platform-based and non-platform trade, and (ii) the mechanisms and the heterogeneity of the potential impacts.

In this paper, we take advantage of a purely informational (non-transactional) online B2B platform and make use of detailed data on both firms' participation in this platform and their export activities as reported to the national customs to overcome these limitations and accurately identify the impact of the reduction of search frictions on firms' exports. In particular, we focus on *ConnectAmericas*, an online B2B platform that has

[6] These sales cover goods and services sold and bought online, including transactions via platform-based firms such as ride and room-sharing apps (see UNCTAD, 2019).

been explicitly established to foster cross-country trade. As of December of 2018, this platform connected more than 45,000 firms from 140 countries. We examine the effects of using it on Peruvian firms' exports. The reason for choosing this country is twofold. First, as we shall show and discuss below, the number of Peruvian firms operating with *ConnectAmericas* is relatively large, which help ensure both the possibility to control in a granular way for multiple confounding factors and have enough statistical power. Second, we have access to the universe of export transactions of Peruvian firms for the period 2010-2018 along with detailed firm-level data on location, sector affiliation, and year of establishment, among other relevant characteristics.

Exploiting this setting, we address three main questions: What are the effects of using online platforms that reduce search and matching costs on firms' exports? What are the mechanisms and specifically the role of different sides of the market (i.e., exporters and importers) behind the observed effects? To what extent are these effects heterogeneous? In answering these questions, we start by applying a difference-in-differences strategy on firm-product-destination-semester-year level data. This allows us both to precisely exploit the registration timing and to account in a granular way for multiple potential unobserved confounders including time-invariant firm-product-destination and time-varying firm- and product-destination-specific factors through fixed effects.

To preview our main findings, estimates suggest that use of the online business platform has resulted in greater firms' exports. On average, export values increase 17% in response to joining the platform. Given that the median firm-product-destination exports for the last semester of our sample period was US$ 3,850, this estimate would imply around US$ 655 additional exports as a result of participating in *ConnectAmericas*. This export increase can be mainly traced back to an expansion of the volumes without changes in unit values and appears to be primarily driven by improved firm visibility.

Admittedly, even though our high dimensional fixed effects go a long way in absorbing factors that could lead to firms' self-selection into the platform and simultaneity, the baseline specification cannot entirely rule these identification threats out (e.g., firms may hire proactive managers who develop and introduce more effective marketing strategies and register the firms to operate with the platform in given semesters). We therefore perform a number of robustness checks. First, we conduct an event study and a series of placebo tests. Consistent with a causal interpretation of our initial findings, these checks reveal positive and significant effects only after the firms joined the platform and no effects before they did so.

Second, we exploit what foreign buying firms do –as opposed to what Peruvian firms in *ConnectAmericas* do– as the main identifying variation. To be more precise, we allow the impact to differ depending on whether or not firms' profiles received visits

from firms in other countries. The estimated effect is only positive and significant for Peruvian firms whose profiles were actually visited regardless of whether they actively connected to the platform or not. In addition, we go a step further along these lines and make use of destination-specific visits to identify the impact of *ConnectAmericas*. More specifically, we restrict the estimating sample to those firms that are part of platform in the semester in question and compare firms' export responses depending on whether their profiles received visits from firms in the destination in question. Estimates indicate that Peruvian firms whose profiles were visited experienced export gains even when they do not actively use the platform to look for business opportunities.

Third, we explicitly assess the information cost mechanism. If these costs are the source of observed impacts, then we would expect the size of the impacts to vary with the level of the costs. We accordingly examine whether effects are heterogeneous across different types of firms, destinations, and products in a manner that is consistent with the severity of information incompleteness along these dimensions. Evidence indicates that impacts are more pronounced for firms without their own website (or other media) and that are small, particularly in more developed and distant destinations, and for differentiated products. Overall, these results point that the baseline effects are primarily explained by higher visibility of exporters through the creation of a digital presence, which helps them become more noticeable to buyers from countries and in products subject to higher information frictions. Finally, we explore the existence of potential general equilibrium effects and the implications for our estimates Findings from this exploration suggest that the platform has led to net trade creation.

Our study contributes to two main strands of literature. First, we add to a series of papers exploring the effects of information and search frictions on international trade (see, e.g. Rauch, 1999; Rauch and Watson, 2003; Allen, 2014; Chaney, 2014; and Eaton et al., 2014; and Starz, 2018).[7] Most papers in this literature focus on one-sided searches, i.e., either the sellers or the buyers proactively search while the other remain entirely passive (see Bernard and Moxnes, 2018). An exception in this regard is Eaton et al. (2016), in whose theoretical model both sellers (exporting producers) and buyers (importing retailers) search for partners.[8] Their paper also highlights that search costs are large and reducing them can lead to substantial welfare gains.[9]

[7] See also Rauch and Trindade (2003), Rauch and Casella (2002, 2003), Besedes (2008), Albornoz et al. (2012), and Atkin et al. (2017).

[8] Krolikowski and McCallum (2019) present a general equilibrium dynamic model in which both heterogeneous exporting producers and homogeneous importing retailers search for business partners. Using calibrations, they show that search frictions have substantial trade and welfare implications.

[9] On trade-related information and buyers see also: Blum et al. (2010), Mion and Opromolla (2014), Macchiavello and Morjaria (2015), Benguria (2015), Kamal and Sundaram (2016), Mion et al. (2017), Sugita et al. (2017), Bernard et al. (2018), Carballo et al. (2018), Monarch and Schmidt-Eisenlohr (2018), and Monarch (2019).

We extend this literature by empirically examining whether and how digital platforms affect search frictions and search efforts and thereby firms' export outcomes. In so doing, we explicitly investigate the role of both sellers (domestic exporting firms) and buyers (foreign importing firms) in these searches and the associated effects thereof.

Second, we complement a number of papers that examine the implications of technologies that can facilitate searches and matches between buyers and sellers and thus reduce their implied costs.[10]

Information and communication technologies, in general, and the internet, in particular, have been shown to reduce price dispersion and favor international trade (see, e.g., Freund and Weinhold, 2002, 2004; Jensen, 2007; Aker, 2010; Kneller and Timmis, 2016; Steinwender, 2018; Juhász and Steinwender, 2019; Hjort and Poulsen, 2019; Akerman et al., 2019; and Fernandes et al., 2019).[11]

More specifically, online consumer-to-consumer (C2C) or business-to consumer (B2C) platforms can help reduce search costs over space and, in particular, the negative effect of distance –as a proxy for information frictions– on trade relative to the offline scenario. This is precisely what Hortaçsu et al. (2009), Lendle et al. (2016), Lendle and Vézina (2015) find using within-country data from eBay for the US and from *Mercado Libre* for some Latin American countries, and cross-country data also from eBay, respectively.[12] Exploiting the introduction of eBay's global shipping program through both an initial random pilot and its later gradual rollout across importing countries, Hui (2018) shows that the trade-increasing effect of this online platform is strengthened when intermediation services –i.e., customs clearance and international shipping and handling– are included. Brynjolfsson et al. (2019) highlight that this is also the case when these platforms are complemented wit artificial intelligence-based machine translation systems. In particular, these systems are associated with increased trade therein, particularly of more products differentiated products and for less experienced buyers.[13]

Finally, Chen and Wu (2017) make use of the fact that online platforms such as *Alibaba.com* allow buyers to share information on exporters' quality to shed light on the value of reputation.[14] Using China's T-shirt exports on this platform, they observe that better reputation based on ratings and the substance of comments translates into larger export revenues, export volumes, and number of destinations and buyers.

[10] There are also papers that examine how transportation can reduce communication costs and thereby increase trade (see, e.g., Cristea, 2011; and Bernard et al., 2020).

[11] See also Fink et al (2005), Blum and Goldfarb (2006), Choi (2010), Lin (2015), and Abeliansky and Hilbert (2017).

[12] Goldmanis et al. (2010) examine how e-commerce has affected the structure of retail industries.

[13] Couture et al. (2020) make use of a randomized control trial carried out in the framework of an explicit program of the Chinese government to expand e-commerce to the country's rural areas to explore its local economic effects.

[14] Cabral and Hortacsu (2010) study the implications of seller reputation using data from eBay.

In general, in this literature, firm-level evidence is scarce and, when available, either firms' use of the technology/platform or their detailed export data from customs is observed, but typically not both. This creates several methodological challenges since it is unknown either whether firms or consumers are utilizing these platforms or whether these are pure o mixed online exporters. In our dataset, we instead observe both and thus clearly establish which firms are using the platform and which not, and track their complete export history using the entire universe of a country's exporting firms, even before the creation of the platform. Furthermore, unlike previous papers, we focus on an online platform that strictly connects firms (B2B) and excludes the transactional components (i.e., payments and logistics). Hence, in principle, we are able to identify in a cleaner way the effects of the associated reduction in information costs in general, and of acquiring knowledge about foreign markets and of searching and directly matching with buying firms in particular.[15]

The remainder of this paper is organized as follows. Section 2 introduces the online business platform *ConnectAmericas* in general and in Peru specifically, describes the dataset, and provides descriptive statistics. Section 3 explains the empirical strategy. Section 4 presents the estimation results, and Section 5 concludes.

2. *ConnectAmericas*, Firms, and Exports in Peru

2.1. ConnectAmericas: An Online Business Platform

ConnectAmericas.com is a business media platform developed by the Inter-American Development Bank (IDB), Google, DHL, SeaLand (Maersk), MasterCard, and Facebook with the purpose of facilitating firms' internationalization. Firms can easily register for free through the website. In so doing, they must create a profile that typically includes a brief description of the company, as well as information on the year of establishment, sector of activity, and main products along with relevant promotional material, number of employees, certifications, commercial presence in terms of destinations (sometimes along with specific customers), affiliation with business associations, employees who are in platform on their behalf and their position, and importantly, how to contact them (only after signing in) (see Figure 1 for two specific examples).

[15] Our paper also relates to the literature on institutional arrangements aimed at reducing information barriers. This is the case with export promotion policies in the public realm (see, e.g., Volpe Martincus and Carballo, 2008 Lederman et al., 2010; Volpe Martincus, 2010; and van Biesebroeck et al., 2016) and with the informal immigrant networks and formal intermediaries in the private sphere (see, e.g., Belderbos and Sleuwaegen, 1998; Head and Ries, 2001; Rauch and Trindade, 2002; and Briant et al., 2014; Feenstra and Hanson, 2004; Antràs and Costinot, 2010, 2011; Felbermayr and Jung, 2011; Ahn et al., 2011; Crozet et al., 2013; Bernard et al., 2015; and Akerman, 2018).

ConnectAmericas provides access to relevant information but neither allows for direct transactions among firms nor incorporates the respective logistic solutions. As such, it is a purely informational business platform. In particular, *ConnectAmericas.com* has two main functions: *Learn* and *Connect*. The *Learn* function offers firms a number of capacity building services that furnish them with general trade information. These services include free online courses and free webinars on trade-related matters; access to trade datasets (INTrade), business self-evaluation tools, video testimonials, and articles; information about support available to firms in the countries where they are operating; and the possibility to share relevant information and ask a question to the community or reply to posts by others.

The *Connect* function instead provides firms with specific commercial information. It primarily allows firms to search for potential partner's profiles and interact with members of their staff, either through a messaging system provided by the platform or through e-mail. In addition, firms can participate in *business communities*, which are forums where they can write posts to make announcements about goods or services that they want to buy or sell; and be notified about *business opportunities*, which consist of purchasing announcements by large firms, and apply to these opportunities.

We have gained access to the platform's database that reports firms' activities therein, including the date at which firms created their accounts and their country –these data are available since the initial year. Importantly, this database also provides information on firms' logins and visits received from peers –these data are available since 2016. *ConnectAmericas* was launched in 2014. By the end of 2018 more than 45,000 firms from 140 countries had registered with and created their profiles in the platform and connected almost 4 million times during that year. With 4,822 firms in *ConnectAmericas*, Peru accounts for more than 10% of this total, being the third country with more participating firms, after Colombia and Brazil (see Table 1 and Figure 2).

2.2. Exporting Firms and ConnectAmericas in Peru

In order to characterize Peruvian firms and their export outcomes we rely on two main databases over the period 2010-2018 that were kindly provided by Peru's tax and customs agency (SUNAT) and Peru's national trade promotion organization (PROMPERU). The first database includes transaction-level export data from customs. Specifically, each record includes the firm's tax ID and name, the product code (10-digit HS), the destination country, the export value in US dollars, and the quantity (weight) in kilograms.[16] The second database has data on firms' characteristics such as location

[16] In our empirical analysis we aggregate data at the 6-digit HS level.

(i.e., department and province), sector of activity (i.e., 4-digit ISIC), year of establishment, number of employees, and trade promotion support status. This database was merged with the customs database as they share the same firms' identifiers (i.e., tax ID and name). The resulting dataset was, in turn, combined with the *ConnectAmericas* database. In this latter case, firms are identified by their tax IDs or their names. In order to match their names there with those in the customs export database we use standard record-matching techniques.[17]

The upper panel of Table 2 reports aggregate indicators of Peruvian exports for each semester over our sample period along with the respective percentage shares that correspond to firms in *ConnectAmericas*. Peruvian total exports amounted to almost US$ 48 billions (around US$ 24 billions per semester) in 2018. Approximately 6,300 firms exported more than 3,100 products to almost 170 destinations in the second semester of that year (see Columns 3, 5, 7, and 9). Firms in *ConnectAmericas* account for a significant share of these aggregate exports. Exporters operating therein (about 350) experienced a tenfold increase since 2015 and represent roughly 6% of the total number in the country, are responsible for approximately 10% of Peru's total export value, and their destination countries and exported products amounted to around three quarters and one quarter of the country's respective totals (see Columns 4, 6, 8, and 10).[18] Almost half of *ConnectAmericas*' firms received visits to their profiles in the platform from more than 100 countries. *Industrial supplies* such as printed matter, trade advertising material, commercial catalogues and the like, vulcanized rubber gaskets, washers and other seals, and articles of paper and paperboard; and *food products* such as grapes and fruits in general, fresh coffee, cereals, asparagus and vegetables in general, molluscs, cuttle fish and squid, account for most exports from *ConnectAmericas* firms (see lower panel Table 2).

As mentioned above, information frictions can play an important role in accounting for distance effects. If *ConnectAmericas* is effective in reducing these frictions, then we would observe that distance matters less for firms using the platform (see, e.g., Hortaçsu et al., 2009; and Lendle et al., 2016). This can be assessed by estimating the following equation for firm f's exports of product p to destination d in semester s in year t:

$$\ln X_{fpdst} = \Sigma_i \Sigma_k \beta_k^{i,k} \zeta_{i_{st}} W_{d(t)}^k + \iota_{fpst} + \upsilon_{fpdst} \tag{1}$$

where $i = \{f \in CA, f \notin CA\}$ identifies whether firm f uses *ConnectAmericas* or does not use *ConnectAmericas* and ζ_i is the corresponding group indicator; $W_{d(t)}^k =$

[17] A detailed explanation of the name-matching methodology is provided in the Appendix.

[18] We have produced an alternative version of Table 2 that excludes exports of extremely heavy products (i.e., minerals and metals) in which Peru has a comparative advantage. While total export values are 60% lower and the percentage share of firms in *ConnectAmericas* raises to 20%, the remaining of the table looks virtually identical. This reflects the fact that Peruvian exports are highly concentrated in a few firms that sell abroad these kinds of products. This table is available from the authors upon request.

$\{lnDIST_{d}, C_{d}, lnGDP_{dt}, lnGDPpc_{dt}, PTA_{dt}\}$ where $DIST$ denotes distance; C stands for contiguity; PTA indicates preferential trade agreement; ι_{fpst} is a set of firm-product-semester-year fixed effects; and v is the error term. Estimates of Equation (1) as obtained from data over the period 2014-2018 are reported in Table A1 in the Appendix. As expected, the negative effect of distance is significantly smaller (in absolute value) for firms operating in the platform.[19]

In the next sections, we introduce the formal empirical approach we use to identify the impact of the platform on firms' export outcomes and then discuss the estimation results.

3. Empirical Methodology

We aim at estimating the effects of using *ConnectAmericas* on firms' exports. This requires us to properly account for other relevant time-invariant and time-varying firm-level and foreign markets' factors that may affect firms' utilization of the platform and their export outcomes. To control for these kinds of factors in the most granular way possible, and take into consideration that firms register with the platform at different dates within a year, we take advantage of the high frequency and high disaggregation of our data. In particular, we estimate the following baseline empirical model of firms' exports across product-destination markets on semester frequency data:

$$\ln X_{fpdst} = \alpha \mathrm{CA}_{fst} + \delta_{fpd} + \rho_{ft} + \gamma_{pdst} + \varepsilon_{fpdst} \tag{2}$$

where $\ln X_{fdst}$ is the natural logarithm of the value of exports a firm f of product p (HS-6 digit) to destination country d in semester s of year t and CA_{fst} is a binary indicator that takes the value of one if firm f is in *ConnectAmericas* in semester s of year t and zero otherwise. The coefficient on CA_{fst}, α, is accordingly our parameter of interest. If $\alpha > 0$ ($\alpha = 0$), then operating with the platform has a positive (no) impact on exports. It is worth mentioning that our estimation period starts in 2013, a year before the website was launched, and ends in 2018, the last available year of our export data.

The remaining terms of Equation (2) correspond to control variables. Specifically, δ_{fpd} is a set of firm-product-destination fixed effects, ρ_{ft} is a set of firm-year fixed effects, and γ_{pdst} is a set of product-destination-semester-year fixed effects. These sets of fixed effects control for a wide range of potential confounding factors including, for instance, firm's systematic knowledge about the destination markets for their specific products over the sample period; time-varying firm-level characteristics and outcomes such as

[19] We use this specification of the gravity equation to be consistent with our baseline estimating equation (see Section 4).

age, number of employees, sales, and productivity, as well as public support policies such as sectoral and regional programs and firm-level export promotion assistance; and both time-invariant and time-varying determinants of sales across destinations and products such as distance and other standard gravity variables, and MFN and preferential tariffs, transport costs, exchange rates, and their changes across all semesters of our sample period, and foreign demand shocks. Finally, ε is the error term.

Based on Equation (2), the effect of *ConnectAmericas* on firm-product-destination exports, α, is identified through the variation over time in firms' presence in the platform, conditional on a comprehensive sets of fixed effects. The latter account for multiple granular factors that might lead to firms' self-selection into the platform and simultaneity. However, they might arguably not be enough to entirely preclude them. Thus, for instance, firms may hire an engaged manager who develops an effective innovative marketing strategy and who is also more resourceful and more likely to find and register the firm in *ConnectAmericas* in a given semester. If this were case, we would be overestimating the actual true impact of the platform. Alternatively, firms with weaker export performance in a given semester might resort more frequently to the platform to boost their sales, in which case we would underestimate its causal effect.

To address these natural endogeneity concerns, we resort to several strategies. First, we conduct an event study and, in addition, placebo tests whereby we assume that firms register with *ConnectAmericas* before they actually do.

Second, we limit the sample to firms that are present in *ConnectAmericas* in the semester in question and take advantage of our data on firms' activities in the platform to identify the effect of interest exclusively through the visits firms received to their profiles from given destinations, all while controlling for firm-semester-year and product-destination-semester-year factors with respective sets of fixed effects.[20] In so doing, we estimate the following equation:

$$\ln X_{\text{fpdst}} = \theta \text{Visits}_{\text{fdst}} + \varrho_{\text{fpd}} + \vartheta_{\text{fst}} + \varkappa_{\text{pdst}} + \xi_{\text{fpdst}} \tag{3}$$

where $f \in CA$; $\text{Visits}_{\text{fdst}}$ is a binary indicator that takes the value of one if the firm f received visits to its profile in the platform from destination d in semester s in year t and zero otherwise; and ϑ_{fst} is a set of firm-semester-year fixed effects, which absorbs the CA membership indicator.

Third, we exploit the fact that participation in the platform is likely to affect differently firms' exports depending on the relative importance of the information frictions

[20] Given that data on platform's usage is only available for 2016, we remove from our baseline sample all firms that started to operate with the platform before 2016. Note that results are essentially the same if we keep those firms in the sample. This is hardly surprising because only a few firms had registered in *ConnectAmericas* prior to 2016. These alternative results are available from the authors upon request.

they face, including whether or not they have other means to address these frictions, the products they sell, and their destination markets. More precisely, impacts can be larger for firms with more limited or no digital presence (i.e., own website and social media accounts), more differentiated products, and less familiar destinations such as OECD countries. We accordingly generalize the baseline equation to explore the existence of heterogeneous effects across those groups as follows:

$$\ln X_{fpdst} = \Sigma_j \Phi_j \alpha_j CA_{fst} + \delta_{fpd} + \rho_{ft} + \gamma_{pdst} + \varepsilon_{fpdst} \quad (4)$$

where j indexes the groups of firms, products, or destination countries; and Φ_j is the corresponding group indicator.

Finally, our variable of interest, CA_{fst}, varies across firms over time and estimation of Equations (2), (3) and (4) can be potentially affected by serial correlation. We therefore cluster standard errors by firm for inference purposes. In particular, we allow for an unrestricted covariance structure over time within firms, which may differ across them.

4. Estimation Results

4.1. Baseline Estimates

Table 3 reports OLS estimates of the effects of *ConnectAmericas* on firms' export values, export weights, and unit values based on alternative specifications of Equation (2). These specifications differ in terms of the stringency of the sets of fixed effects. They go from a variant with no covariates (i.e., neither time-varying firm-level variables nor fixed effects) to our baseline which includes firm-product-destination fixed effects -the dimension of our panel- and, in addition, firm-year and product-destination-semester-year fixed effects; and encompass versions that incorporate less demanding controls for firm- and market-level potential confounding factors (i.e., time-varying firm-level variables such as age and number of employees with and without region-sector-year fixed effects and firm time-trends, and product-destination-year fixed effects). While -as expected- the point estimates differ, they convey a consistent message: participation at the platform has been associated with larger firms' export values, which can be traced back almost entirely to expansions in volumes. In particular, according to the estimates of our baseline specification, export values (and weights) increase 17% in response to joining the platform (see Column 8). Note that the estimated impact is similar when considering an alternative equation that includes firm-level covariates combined with region-sector-year fixed effects instead of firm-year fixed effects.[21] To put this figure

[21] It should be also mentioned that this latter specification does not incorporate product-destination-semester-year fixed effects but just product-destination-year fixed effects.

into perspective, the sample median of firm-product-destination exports for the second semester of 2018 is US$ 3,850, so this estimate would imply, at the median, almost US$ 655 additional exports thanks to working with *ConnectAmericas*.

Table 4 presents estimates of other variants of the baseline specification that primarily assess the implications of different time windows and sample composition. More precisely, these variants are estimated on data at different frequency (i.e., annual, biannual, and quarterly) and considering both all firms and exclusively firms that are present every year. These results suggest that the estimated impact of *ConnectAmericas* is positive and significant regardless of the frequency of the data and whether or not firm entry and exit are allowed. Overall, estimates are consistent across alternative specifications, time windows, and exporter conditions –i.e., permanent or non-permanent.

4.2. Robustness

In this subsection, we discuss the results of several robustness checks that aim at addressing the main identification concern, namely, potential endogeneity biases derived from self-selection of firms into *ConnectAmericas*. These robustness checks include (i) an event study along with placebo tests; (ii) estimations that exploit information on firms' activity in the platform such that identifying variation primarily is restricted to come from what other firms do in terms of profile visits, even limiting the sample to registered firms in the semester in question; and (iii) exploration of how estimated impacts vary with firms' characteristics and whether these heterogeneous impacts are consistent with reduction in information costs and specifically search costs as proxied by these characteristics.

Admittedly, registration in *ConnectAmericas* can be correlated with firms' previous export outcomes. Thus, best performing firms may have been the first users of the platform. If that was the case, we would observe a gap between *CA* firms and non-*CA* firms' exports before the first actual use of the platform or even before its establishment altogether. We examine this concern with help of an event study and a series of placebo tests. In the event study we track the behavior of product-destination export flows from firms that joined *ConnectAmericas* in a given semester a number of semesters before and after that registration semester. Estimates are shown in Figure 3. In accordance with a causal interpretation of the findings reported so far, the estimates of the respective equation are not significant before the first use of *ConnectAmericas* and become significant once firms are part of the platform.[22]

[22] The sample is limited to firms that are present throughout the entire sample period (2013-2018). Estima-

The placebo tests specifically amount to regressing current (t) exports in future ($t + j$ where $j \geq 1$) *CA* participation. Thus, we estimate Equation (2) replacing the real *CA* indicator with an artificial counterpart which implies assuming that *CA* was already in use in a period before the actual first use of platform. To be precise, suppose that $CA_{fst} = 1$ for the first time in semester $st = y$, then we generate a binary indicator that equals one in the semester before the first use of *ConnectAmericas*, $Artificial\ CA_{f(st-1)} = 1$, and zero otherwise, and estimate its effect over the sample of exports that do not actually use *ConnectAmericas*, i.e., we drop all observations with $CA_{fst} = 1$. We replicate this exercise for up to six semesters of forward platform membership and for different starting years of our placebo sample. Estimates of these equations are shown in Table 5. For comparison, we report estimates of our baseline estimation restricting the treated sample to the real first use of the platform.[23] Reassuringly, none of these placebo regressions show significant effects, but the baseline regression do.

In addition to these standard robustness checks, we exploit a unique feature of our dataset that enables us to implement an alternative strategy to address the potential self-selection of firms into *ConnectAmericas*. In particular, this dataset reports firms' activities on the platform. Specifically, we can see whether and when firms logged in and whether and when their profiles received visits (hereafter "Visits") and the countries where these visits originated ("Visits from Destination"). Based on this information, we can assess whether *ConnectAmericas*' estimated impact primarily comes from what Peruvian firms themselves do as exporters searching for business opportunities -more subject to self-selection- or from what foreign firms do as importers searching for commercial partners that can supply the goods they are looking for -less subject to self-selection-.[24]

To do so, we first estimate a variant of Equation (4) that allows the effect of the platform to differ depending on whether firms' profiles have been visited or not, whether firms logged into the platform or not, and their combinations. Estimates are presented in Table 6. These estimates provide a number of important insights in terms of identification. First, *ConnectAmericas* only has a positive and significant impact when firms' profiles in the platform have received visits from other firms (see Column 2). These firms experience an increase of 28% in their foreign sales. Second, visits from indi-

tion results are similar when the sample is restricted to the number of pre- and post-treatment periods considered in this analysis. These alternative estimation results are available from the authors upon request.

[23] The number of observations differs across columns because in the placebo estimations we restrict the sample to non-CA observations, thus excluding the year in which the first CA was observed.

[24] Data on connections and visits are only available for the period 2016-2018. Hence, we remove firms that registered with *ConnectAmericas* in 2014 and 2015 from the sample in the estimations that follow. In this regard, it is worth mentioning that estimation results are similar if these firms are not dropped or the sample period is restricted to 2015-2018. These results are available from the authors upon request.

viduals not associated with firms (e.g., *ConnectAmericas*' personnel and public officials) -which can be considered placebo visits-, as expected, do not have any effect (see Column 3). Third, whether firms have connected or not to the platform does not seem to make a difference. *ConnectAmericas* positively affects exports regardless of what firms themselves do therein (see Column 4). Fourth and to sum up, the platform results in increased foreign sales when Peruvian firms' profiles have been visited had these firms actively used it or not but does not favor such an increase in the absence of these visits no mater what Peruvian firms have done (see Column 5).

While this substantially reduces the risk that self-selection drives at least partially our estimates, it does not completely eliminate it, as these estimates are still based on comparisons in a sample that includes both registered and non-registered firms. We therefore go a step further and restrict the sample to firms in *ConnectAmericas* in the semester in question and, crucially, limit the main identifying variation to visits received from specific destinations over time. We do so by estimating Equation (3). Estimates of this equation and variants thereof are shown in the upper panel of Table 7. These estimates suggest that *ConnectAmericas* firms whose profiles received visits increased their sales to the countries where these visits originated significantly more than their counterparts that did not receive such visits (see Column 1). As expected, this export increasing effect is stronger when the number of visits is larger and, in this case, firms have connected and actively used the platform (see Columns 2 and 3). Importantly, the estimated impact of receiving visits from specific destinations when *ConnectAmericas* firms have not logged into it is very similar to that identified based on non-destination specific visits on the entire sample.

These estimations are obtained considering both visited and non-visited firms. Arguably, these firms could potentially differ in terms of unobservable factors that interact with their visit status. In this sense, it is worth mentioning that point estimates are virtually identical when the sample is further restricted to firms whose profiles were visited at least once over the period under study (see lower panel of Table 7). The same holds when these visits took place in given years.[25] Hence, for given *ConnectAmericas*' firms with visited profiles, exports experienced increases to those destinations where these visits come from.

Besides addressing a major identification concern, previous results indicate that increased visibility and thereby reduced information frictions can be an important mechanism, through which *ConnectAmericas* can help increase firms' exports. We provide additional supporting evidence in this regard by estimating a variant of Equation (4) that distinguishes between firms with no digital presence (besides the *ConnectAmericas*'

[25] These additional results are available from the authors upon request.

profile), firms with their own websites, and firms with both their own websites and their own social media accounts.[26] Estimation results are reported in Table 8. As expected, these results reveal that the platform only appears to make a significant difference when firms initially neither had their own website nor their own social media accounts. This is consistent with anecdotal evidence discussed in Eaton et al. (2014), according to which researching potential foreign partners and sustaining a web presence are among the most expensive activities exporters undertake.[27]

Next, we look at the role of the platform as an information barrier-reducing mechanism from a different angle. In particular, we compare export responses for products, destinations, and firms that are subject to more severe information frictions with their respective counterparts, for which these frictions are less relevant. Thus, we divide: (i) products based on their degree of information intensity as proxied by Rauch (1999)'s classification –i.e., differentiated vs. non-differentiated products; (ii) destinations based their degree of familiarity with Peruvian firms as proxied by OECD and non-OECD countries; (iii) firms based on their exposure and sensitivity to imperfect information as proxied by their size –i.e., small firms vs. large firms in terms of their number of employees-; and (iv) the combinations of the former.[28] Estimates of the corresponding variants of Equation (4) are presented in Table 9. These estimates indicate that *ConnectAmericas*' positive and significant effects are confined to exports to the less familiar OECD destinations, of more complex differentiated products, and from handicapped smaller firms (see upper panel of Table 9). More precisely, participation in the platform is associated with increased exports only for differentiated goods destined to developed countries.[29] Interestingly, small firms benefit from *ConnectAmericas* in several dimensions. They export more differentiated products to both OECD and non-OECD destinations and of non-differentiated products to OECD destinations. Overall, these results indicate that the platform has a trade increasing effect, derived from a reduction in information barriers and matching frictions.

Finally, we examine the existence of potential general equilibrium effects from trade activities by *ConnectAmericas*' firms and their implications for the estimates of interest. Following Redding and Turner (2015), we investigate the presence of possible cross-

[26] Data on firms' digital presence come from PROMPERU's Customer Relationship Management (CRM) system.

[27] Other expensive activities include maintaining foreign sale offices and supporting sale representations abroad (see Eaton et al. (2014). These are typically out of reach for smaller firms, which account for most of the firms in *ConnectAmericas*.

[28] The definition of OECD used in this estimation does not include the Latin American countries that were members over our sample period (i.e., Chile and Mexico). We consider small firms those with up to 50 employees and large firms those with more than 50 employees. Results are robust to using alternative cuts such as 100 employees. These alternative results are available from the authors upon request.

[29] This is specifically the case for the United States. A table with destination-specific results is available from the authors upon request.

effects from the angle of non-*ConnectAmericas*' firms. More specifically, we estimate a variant of Equation (2) on the sample of these latter firms in which the main explanatory variable is a binary indicator that takes the value of one if *ConnectAmericas*' firms, either in general or located in the same province, export more than 50% of its products, to more than 50% of its destinations, and to more than 50% of its product-destination combinations, and zero otherwise.[30] Estimates are reported in Table 10. These estimates point to neither positive information spillovers nor negative pecuniary externalities (crowding out).This is in line with findings by Koenig et al. (2010), according to which no substantial spillovers appear to exist on export volumes. Taken together, these results suggest that the platform has helped create trade.[31]

5. Concluding Remarks

Information frictions are a major trade deterrent. Over time multiple institutional arrangements have been introduced to ameliorate their incidence, including business networks, intermediation services, and export promotion policies. New information and communication technologies came with the promise to further reduce these frictions by lowering the search costs firms must incur in identifying appropriate business partners and boost international trade. In this paper, we provide microeconometric evidence that this is indeed the case. In so doing, we apply a difference-in-differences approach on firm-level data on the utilization of a purely informational B2B online platform and transaction-level export data covering the whole population of exporting firms in a developing country, and conduct several robustness check exercises to address potential endogeneity biases associated with firms' self-selection into the platform. Estimates suggest that use of the platform resulted in additional exports. This positive export effect is primarily associated with an increased visibility of firms to foreign buyers and holds even if they do not actively look for business opportunities in the platform. Impacts are consistently stronger for smaller firms without digital presence, less familiar destinations, and differentiated products.

[30] The sample consists of firms that are not registered with *ConnectAmericas* in the semester in question. Results are virtually identical if the binary indicator is defined based on simple overlapping (i.e., at least one product, at least one destination, and at least one product-destination combination, respectively) and if the sample only includes firms that never join the platform. These results are available from the authors upon request.

[31] Alternatively, we estimate Equation (2) on a sample in which the control group is restricted to non-*ConnectAmericas*' firms which belong to the same combinations of these dimensions as *ConnectAmericas*' firms. Consistent with the existence of localized specific information spillovers, the estimated coefficient on *CA* is smaller the more narrowly defined are the control groups (i.e., province vs. province-product-destination). Still, such estimated coefficients remain positive and significant and do not significantly differ from the baseline. These results are available from the authors upon request.

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Table 1
CA Worldwide and in Peru

Year	Semester	Number of Firms	Number of Countries	Number of Connections	Number of Peruvian Firms
2013	**1**	0	0	-	0
2013	**2**	0	0	-	0
2014	**1**	833	41	-	22
2014	**2**	2,671	56	-	135
2015	**1**	3,667	63	-	273
2015	**2**	5,925	77	-	470
2016	**1**	9,133	100	127,949	830
2016	**2**	16,258	112	676,607	1,774
2017	**1**	22,979	117	820,954	2,572
2017	**2**	30,257	123	1,341,684	3,374
2018	**1**	38,377	135	1,776,095	4,398
2018	**2**	45,132	141	2,108,631	4,822

Source: Authors' calculations based on data from *ConnectAmericas*.
The table reports the number of firms registered with *ConnectAmericas*, the number of countries with at least one firm registered with the platform, the number of connections to the platform, and the number of Peruvian firms registered with the platform.

Table 2
CA Exporting Firms and Exports in Peru

Year	Semester	Export Value		Number of Exporting Firms		Number of Destinations		Number of Products	
		Total	Share CA Firms	Total	Share CA Firms	Total	Share CA Firms	Total	Share CA Firms
2013	**1**	20,329	0.000	6,016	0.000	168	0.000	3,029	0.000
2013	**2**	21,822	0.000	6,412	0.000	169	0.000	3,099	0.000
2014	**1**	18,650	0.001	6,124	0.016	166	4.217	3,053	0.229
2014	**2**	19,511	0.080	6,327	0.111	176	13.068	3,051	1.475
2015	**1**	16,054	0.277	5,750	0.417	166	30.120	2,983	3.051
2015	**2**	17,538	0.293	6,043	0.563	167	34.731	3,076	4.519
2016	**1**	15,720	0.572	5,640	0.993	165	39.394	3,039	6.713
2016	**2**	20,517	1.991	6,008	2.480	162	51.852	3,048	13.189
2017	**1**	20,275	3.152	5,879	3.215	164	63.415	3,078	16.927
2017	**2**	23,752	3.182	6,169	3.420	167	64.072	3,160	18.513
2018	**1**	24,032	10.612	6,055	5.533	168	69.048	3,128	23.785
2018	**2**	23,885	10.830	6,305	5.710	169	73.373	3,164	26.327

Composition of Exports from CA Firms

Year	Semester	Industrial Supplies	Food Products	Textiles	Other Consumer Goods
2014	**1**	100.000	0.000	0.000	0.000
2014	**2**	1.907	97.747	0.000	0.346
2015	**1**	2.188	97.663	0.000	0.149
2015	**2**	2.441	97.400	0.042	0.117
2016	**1**	6.164	92.837	0.262	0.737
2016	**2**	15.337	83.789	0.263	0.611
2017	**1**	38.750	54.967	0.184	6.099
2017	**2**	36.501	57.990	0.654	4.855
2018	**1**	76.791	20.611	0.596	2.002
2018	**2**	73.220	23.622	0.998	2.160

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The top panel of the table reports Peru's total export value, number of exporting firms, number of destination countries, and number of exported products (Columns 3, 5, 7, and 9, respectively) and the respective shares of firms registered with *ConnectAmericas* in these aggregates (Column 2, 4, 6, and 8, respectively) in each semester of our sample period, 2013-2018. The bottom panel reports the percentage distribution of *ConnectAmericas* firms' total export values across good categories: food products, industrial supplies, textiles, and other consumer goods.

Table 3
The Impact of *ConnectAmericas* on Firms' Exports
Baseline Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Export Value								
CA	0.894***	0.597***	0.107***	0.118***	0.161***	0.145***	0.255***	0.157**
	(0.176)	(0.203)	(0.041)	(0.033)	(0.035)	(0.0392)	(0.0552)	(0.074)
Export Weight								
CA	1.700***	1.353***	0.151***	0.125***	0.175***	0.142***	0.260***	0.158**
	(0.248)	(0.251)	(0.041)	(0.034)	(0.036)	(0.040)	(0.055)	(0.077)
Unit Value								
CA	-0.805***	-0.755***	-0.044**	-0.006	-0.014	0.003	-0.004	-0.001
	(0.160)	(0.153)	(0.017)	(0.012)	(0.014)	(0.013)	(0.0178)	(0.024)
Firm-Product-Destination Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	Yes	No	No	No	No	No
Time Varying Firm Level Control Variables	No	Yes	Yes	Yes	Yes	Yes	No	No
Firm-Time Trend	No	No	No	No	No	Yes	No	No
Firm-Year Fixed Effects	No	No	No	No	No	No	Yes	Yes
Firm-Product-Year	No	No	No	No	No	No	No	No
Firm-Destination-Year	No	No	No	No	No	No	No	No
Region-Sector-Year Fixed Effects	No	No	No	No	Yes	Yes	No	No
Product-Destination-Year Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	No
Product-Destination-Semester-Year Fixed Effects	No	No	No	No	No	No	No	Yes
Observations	637,541	637,541	637,541	637,541	637,541	637,541	637,541	637,541

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The table presents OLS estimates of alternative specifications of Equation (2). The dependent variables are the natural logarithm of export value, export weight, and unit value at the firm-product-destination-semester-year level (first, second, and third row, respectively). The main explanatory variable is a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise. Column 1: neither fixed effects nor time-varying firm-level covariates included; Column 2: time-varying firm-level covariates included (natural logarithm of age, natural logarithm of number of employees, a binary indicator that takes the value of one if the firm was assisted by the national export promotion agency and zero otherwise); Column 3: firm-product-destination fixed effects, year fixed effects, and time-varying firm-level covariates included (natural logarithm of age, natural logarithm of number of employees, a binary indicator that takes the value of one if the firm was assisted by the national export promotion agency and zero otherwise); Column 4: firm-product-destination fixed effects, product-destination-year fixed effects, and time-varying firm-level covariates included (natural logarithm of age, natural logarithm of number of employees, a binary indicator that takes the value of one if the firm was assisted by the national export promotion agency and zero otherwise); Column 5: firm-product-destination fixed effects, region(province)-sector(4-digit ISIC)-year, product-destination-year fixed effects, and time-varying firm-level covariates included (natural logarithm of age, natural logarithm of number of employees, a binary indicator that takes the value of one if the firm was assisted by the national export promotion agency and zero otherwise); Column 6: firm-product-destination fixed effects, region(province)-sector(4-digit ISIC)-year, product-destination-year fixed effects, firm time trend, and time-varying firm-level covariates included (natural logarithm of age, natural logarithm of number of employees, a binary indicator that takes the value of one if the firm was assisted by the national export promotion agency and zero otherwise); Column 7: firm-product-destination fixed effects, firm-year fixed effects, and product-destination-year fixed effects; Column 8: firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects (no fixed effects reported). Standard errors clustered by firm shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Table 4
The Impact of *ConnectAmericas* on Firms' Exports
Alternative Specifications

	(1) Annual	(2) Semester	(3) Quarter	(4) Semester
All Firms				
CA	0.086**	0.255***	0.093***	0.157**
	(0.038)	(0.055)	(0.039)	(0.074)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes	Yes
Firm-Year Fixed Effects	No	Yes	Yes	Yes
Product-Destination-Year Fixed Effects	Yes	Yes	Yes	No
Product-Destination-Semester-Year Fixed Effects	No	No	No	Yes
Observations	503,612	643,790	819,787	643,790
Permanent Exporters				
CA	0.097**	0.257***	0.092**	0.191**
	(0.,041)	(0.059)	(0.041)	(0.083)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes	Yes
Firm-Year Fixed Effects	Yes	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	298,753	406,624	543,934	406,624

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The top panel of the table presents OLS estimates of alternative specifications of Equation (2). The dependent variable is the natural logarithm of export value at the firm-product-destination-year level (Column 1), firm-product-destination-semester-year level (Columns 2 and 4), and firm-product-destination-quarter-year level (Column 3). The main explanatory variable is a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the period in question and zero otherwise. Column 1: firm-product-destination fixed effects and product-destination-year fixed effects included; Columns 2-3: firm-product-destination fixed effects, firm-year fixed effects, and product-destination-year fixed effects included; and Column 4: firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (no fixed effects reported). The bottom panel of the table presents OLS estimates of these alternative specifications of Equation (2) as obtained on the sample of permanent exporters—i..e, firms that exported all years between 2013 and 2018. The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. The main explanatory variable is a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise along with varying number of lags. Firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (not reported). Standard errors clustered by firm shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Table 5
The Impact of *ConnectAmericas* on Firms' Exports
Placebo Tests

	(1) 2013-2018	(2) 2013-2018	(3) 2012-2018	(4) 2011-2018
CA	0.179**			
	(0.081)			
CA(+1)		0.069	0.059	0.063
		(0.053)	(0.054)	(0.054)
CA(+2)		0.015	0.020	0.011
		(0.047)	(0.047)	(0.046)
CA(+3)		-0.090	-0.094	-0.086
		(0.056)	(0.057)	(0.057)
CA(+4)		0.069	0.070	0.067
		(0.055)	(0.057)	(0.056)
CA(+5)		-0.076	-0.075	-0.071
		(0.054)	(0.052)	(0.052)
CA(+6)		0.089	0.087	0.084
		(0.0573)	(0.056)	(0.057)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes	Yes
Firm-Year Fixed Effects	Yes	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes	Yes

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The table presents OLS estimates of Equation (2). Treated observations are restricted to the first actual or artificial use of the platform. Different sample periods are considered: 2013-2018 (Columns 1 and 2), 2012-2018 (Column 3), and 2011-2018 (Column 4). The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. The main explanatory variable are (i) a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise (Row 1) and binary indicators that take the value of one if the firm will register with *ConnectAmericas* in j={1, 2, 3, 4, 5, 6} semesters in the future and zero otherwise. Firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (not reported). Standard errors clustered by firm shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Table 6
The Impact of *ConnectAmericas* on Firms' Exports
Received Visits and Own Logins into the Platform

	(1)	(2)	(3)	(4)	(5)
CA	0.196***				
	(0.076)				
CA x Visits		0.248***	0.248***		
		(0.088)	(0.088)		
CA x No Visits		0.117	0.117		
		(0.073)	(0.073)		
CA x Placebo Visits			-0.039		
			(0.167)		
CA x Logins				0.199***	
				(0.077)	
CA x No Logins				0.187*	
				(0.107)	
CA x Visits x Logins					0.231**
					(0.093)
CA x Visits x No Logins					0.279**
					(0.125)
CA x No Visits x Logins					0.149
					(0.093)
CA x No Visits x No Logins					0.118
					(0.099)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	642,775	642,775	642,775	642,775	642,775

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The table presents OLS estimates of alternative specifications of Equation (2) and Equation (3) as obtained on the sample excluding firms registered with *ConnectAmericas* in 2014 and 2015. The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. The main explanatory variable, CA, is a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise either alone (Column 1) or interacted with a number of binary indicators (Columns 2-5). Visits: binary indicator that takes the value of one if the firm's profile in *ConnectAmericas* received visits from foreign firms in the semester in question and zero otherwise; No Visits: binary indicator that takes the value of one if the firm's profile in *ConnectAmericas* did not receive visits from foreign firms in the semester in question and zero otherwise; Placebo Visits: binary indicator that takes the value of one if the firm's profile in *ConnectAmericas* received non-commercial visits (i.e., from the platform's staff or public officials) in the semester in question and zero otherwise; Logins: binary indicator that takes the value of one if the firm logged into *ConnectAmericas* in the semester in question and zero otherwise; and No Logins: binary indicator that takes the value of one if the firm did not log into *ConnectAmericas* in the semester in question and zero otherwise. Firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (not reported). Standard errors clustered by firm shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Table 7
The Impact of *ConnectAmericas* on Firms' Exports
Received Visits and Own Connections, Only Firms in *ConnectAmericas*

	(1)	(2)	(3)
All Firms in *ConnectAmericas*			
Visits from Destination	0.287**		
	(0.111)		
Visits from Destination x Logins		0.419**	
		(0.202)	
Visits from Destination x No Logins		0.261**	0.279**
		(0.128)	(0.131)
Visits from Destination > Median x Logins			0.721**
			(0.286)
Visits from Destination < Median x Logins			0.295
			(0.228)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Firm-Semester-Year Fixed Effects	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	19,754	19,754	19,754
Only Firms in *ConnectAmericas* that Received at Least One Visit from a Destination			
Visits from Destination	0.293**		
	(0.116)		
Visits from Destination x Logins		0.359*	
		(0.204)	
Visits from Destination x No Logins		0.279**	0.302**
		(0.132)	(0.134)
Visits from Destination > Median x Logins			0.688**
			(0.277)
Visits from Destination < Median x Logins			0.214
			(0.220)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Firm-Semester-Year Fixed Effects	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	14,735	14,735	14,735

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The table presents OLS estimates of alternative specifications of Equation (3) as obtained on the sample of firms that were registered with *ConnectAmericas* in the semester in question but those that joined in 2014 and 2015 (top panel) and the sample of firms that were registered with *ConnectAmericas* in the semester in question but those that joined in 2014 and 2015 and whose profiles received at least one visit from a destination over the sample period (bottom panel). The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. The main explanatory variable, Destination, is a binary indicator that takes the value of one if the firm's profile in *ConnectAmericas* received visits from the destination in the semester in question and zero otherwise, either alone (Column 1) or interacted with a number of binary indicators (Columns 2-3). Logins: binary indicator that takes the value of one if the firm logged into *ConnectAmericas* in the semester in question and zero otherwise; No Logins: binary indicator that takes the value of one if the firm did not log into *ConnectAmericas* in the semester in question and zero otherwise; Destination > Median: binary indicator that takes the value of one if the firm's profile in *ConnectAmericas* received more than the median number of visits from the destination in the semester in question and zero otherwise; and Destination < Median: binary indicator that takes the value of one if the firm's profile in *ConnectAmericas* received up to the median number of visits from the destination in the semester in question that was equal or below the median and zero otherwise. Firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (not reported). Standard errors clustered by firm shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Table 8
The Impact of *ConnectAmericas* on Firms' Exports
Heterogeneous Effects: Digital Presence

	(1)	(2)	(3)
CA x No Media	0.206**	0.206**	0.206**
	(0.089)	(0.089)	(0.089)
CA x {Web or Social Media]	0.187		
	(0.116)		
CA x Web		0.203	0.203
		(0.126)	(0.126)
CA x [Web and Social Media]		0.023	
		(0.134)	
CA x [Web and Facebook]			-0.073
			(0.186)
CA x [Web and Twitter]			-0.360
			(0.237)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Firm-Year Fixed Effects	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	642,775	642,775	642,775

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The table presents OLS estimates of alternative specifications of Equation (3) as obtained on the sample of firms that were registered with *ConnectAmericas* in the semester in question but those that joined in 2014 and 2015. The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. The main explanatory variable, CA, is a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise, interacted with a number of binary indicators. Web or Social Media: binary indicator that takes the value of one if the firm had some form of digital presence (website or social media accounts) and zero otherwise; Web: binary indicator that takes the value of one if the firm had own website and zero otherwise; Social Media: binary indicator that takes the value of one if the firm had at least one social media account and zero otherwise; Facebook: binary indicator that takes the value of one if the firm had a Facebook account and zero otherwise; Twitter: binary indicator that takes the value of one if the firm had a Twitter account and zero otherwise; and No Media: binary indicator that takes the value of one if the firm had no digital presence (neither website nor social media accounts) and zero otherwise. Firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (not reported). Standard errors clustered by firm shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Table 9
The Impact of *ConnectAmericas* on Firms' Exports
Heterogeneous Effects: Types of Firms, Destinations, and Products

	(1)	(2)	(3)
	Product	**Destination**	**Firm Size**
CA x Differentiated Products	0.203**		
	(0.087)		
CA x Non-Differentiated Products	0.106		
	(0.074)		
CA x OECD Destination		0.175**	
		(0.077)	
CA x Non-OECD Destination		0.112	
		(0.090)	
CA x Small Firms			0.248***
			(0.095)
CA x Large Firms			0.045
			(0.101)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Firm-Year Fixed Effects	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	643,790	643,790	643,790
Product-Destination\Firm Size	**All Firms**	**Small Firms**	**Large Firms**
CA x Differentiated Products x OECD Destination	0.220**	0.255**	0.179
	(0.094)	(0.129)	(0.117)
CA x Differentiated Products x Non-OECD Destination	0.164	0.283**	0.053
	(0.115)	(0.139)	(0.163)
CA x Non-Differentiated Products x OECD Destination	0.127	0.279***	-0.009
	(0.080)	(0.097)	(0.110)
CA x Non-Differentiated Products x Non-OECD Destination	0.053	0.024	-0.008
	(0.101)	(0.145)	(0.131)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Firm-Year Fixed Effects	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	643,790	643,790	643,790

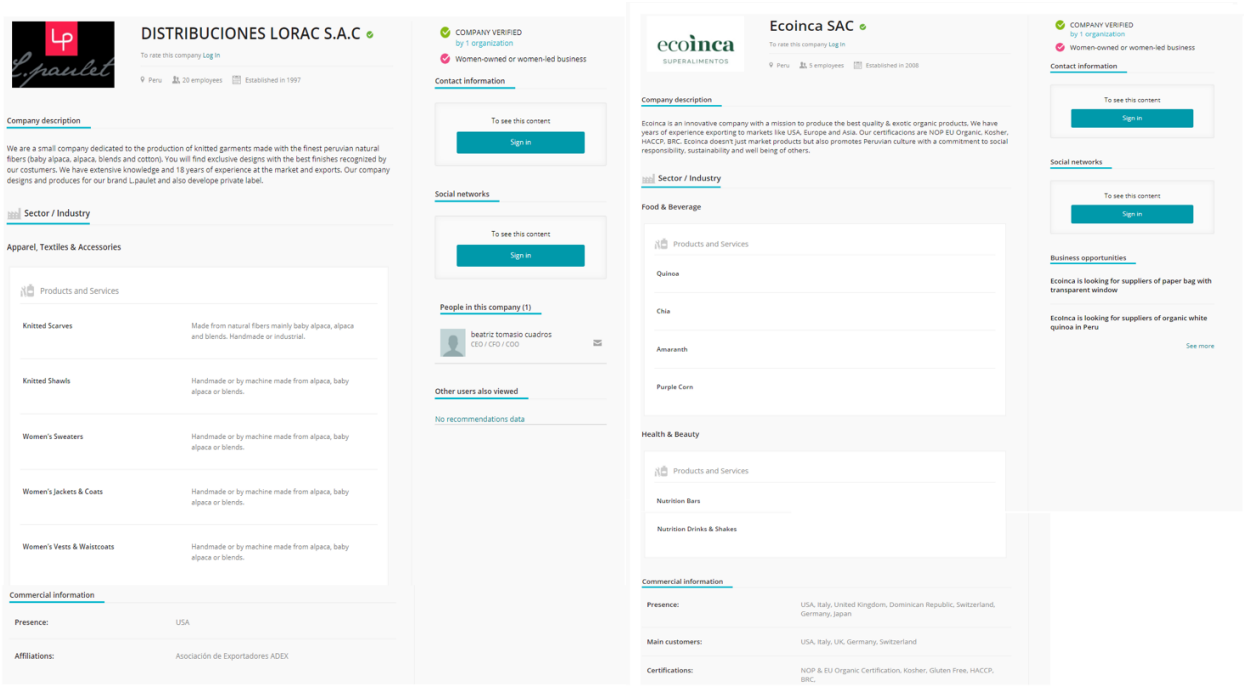
Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The table presents OLS estimates of alternative specifications of Equation (3) as obtained on the sample that were registered with *ConnectAmericas* in the semester in question but those that joined in 2014 and 2015. The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. The main explanatory variable, CA, is a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise, interacted with a number of binary indicators. Differentiated Products: binary indicator that takes the value if the product is differentiated according to the classification proposed by Rauch (1999) and zero otherwise; No Differentiated Products: binary indicator that takes the value if the product is not differentiated according to the classification proposed by Rauch (1999) and zero otherwise; OECD Destination: binary indicator that takes the value if the destination is member of the OECD (but Chile and Mexico) and zero otherwise; No OECD Destination: binary indicator that takes the value if the destination is not member of the OECD (but Chile and Mexico) and zero otherwise; Small: binary indicator that takes the value of one if the firm has up to 50 employees and zero otherwise; and Large: binary indicator that takes the value of one if the firm has more than 50 employees and zero otherwise. Firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (not reported). Standard errors clustered by firm shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Table 10
The Impact of *ConnectAmericas* on Firms' Exports
General Equilibrium Effects

	(1)	(2)	(3)
	Destination(s)	**Product(s)**	**Product-Destination(s)**
CA Firms in more than 50% of the Firms'	0.647	-0.013	-0.037
	(0.415)	(0.043)	(0.027)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Firm-Year Fixed Effects	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	623,021	623,021	623,021
	Colocation with CA Firms (Same Province)		
CA Firms in more than 50% of the Firms'	0.649	-0.019	-0.040
	(0.414)	(0.044)	(0.027)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Firm-Year Fixed Effects	Yes	Yes	Yes
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	609,683	609,683	609,683

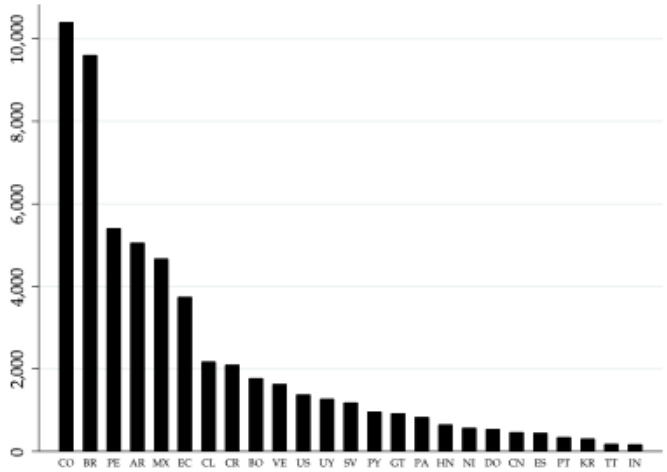
Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The top panel of the table reports OLS estimates of a modified version of Equation (2) on the sample of firms that are not registered with *ConnectAmericas* in the semester in question. The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. The main explanatory variable is a binary indicator that takes the value of one if firms registered with *ConnectAmericas* export to more than 50% of a firm's destination, more than 50% of the products it sells abroad, or export to more than 50% of the firm's product-destination combinations, and zero otherwise. the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise, interacted with a number of binary indicators. In the bottom panel, only non-*ConnectAmericas* firms located in firms in which there are also present *ConnectAmericas* firms are considered. Firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (not reported). Standard errors clustered by firm shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Figure 1
Firms' Profile in *ConnectAmericas*: Two Specific Examples



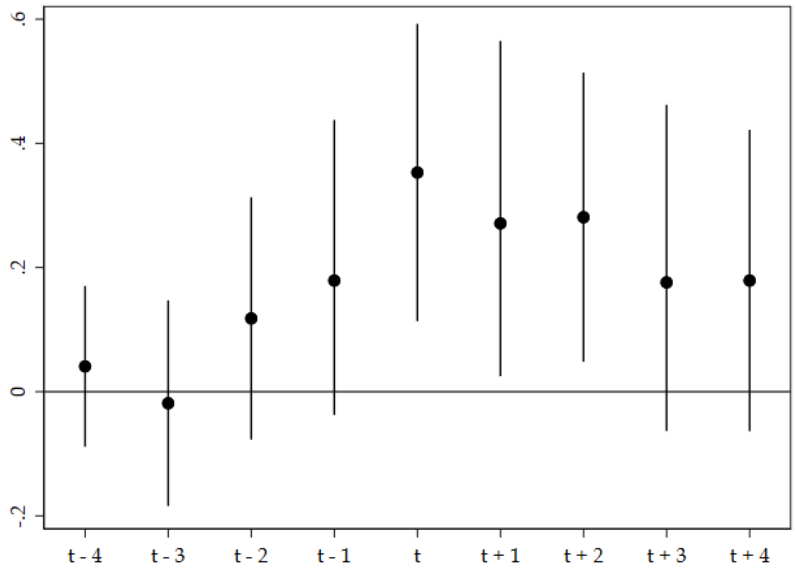
Source: *ConnectAmericas*.

Figure 2
Firms in *ConnectAmericas:* Distribution by Country, Second Semester of 2018



Source: Authors' calculations based on data from *ConnectAmericas*.
The figure shows the number of firms registered with *ConnectAmericas* the top 25 countries.

Figure 3
The Impact of *ConnectAmericas* on Firms' Exports
Event Study



Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.
The figure presents OLS estimates of a modified version of Equation (2) along with thei respective 90% confidence intervals. Product-destination export flows from firms that joined *ConnectAmericas* in a given semester are tracked four semesters before and after that registration semester. The sample is restricted to firms that are present throughout the sample period (2013-2018). The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. The main explanatory variable are a series of binary indicators that take the value of one if the firm registered with *ConnectAmericas* in the semester in question or j={1, 2, 3, 4} semesters before or after it actually registered with the platform. Firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (not reported). Confidence intervals are based on standard errors clustered by firm.

Appendix

Table A1
Gravity Estimates: Firms in *ConnectAmericas* and Firms not in *ConnectAmericas*

	Non-CA Firms	CA Firms
Distance	-0.469***	-0.367***
	(0.155)	(0.168)
Contiguity	0.048	0.397
	(0.154)	(0.261)
GDP	0.228***	0.280***
	(0.043)	(0.041)
GDPpc	0.130**	-0.006
	(0.061)	(0.124)
PTA	0.032	0.144
	(0.118)	(0.243)
Firm-Product-Semester-Year Fixed Effects	Yes	
Observations	609,731	

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*.

The table presents OLS estimates of Equation (1) as obtained on the sample 2014-2018. The dependent variable is the natural logarithm of export value at the firm-product-destination-semester-year level. Firm-product-semester-year fixed effects included (not reported). Standard errors clustered by destination country shown underneath of the respective estimated coefficients. *** significant at the 1% level; ** significant at the 5% level; and * significant at the 10% level.

Name Harmonization and Matching Methodology

Firms are not required to fill in the tax ID field to register in *ConnectAmericas*. We therefore resort to two strategies to merge the platform's database and the customs' database. For those firms for which it is available in both databases, we use the tax ID to match them. For those firms for which no tax ID has been reported in *ConnectAmericas*, we rely on firms' names to match them. Now, these names generally differ in both databases. This could be due to the type of business structure or due to spelling. In the first case, it could happen that a firm appears as an S.R.L. (*Sociedad de Responsabilidad Limitada*, the equivalent of a Limited Liability Company in the U.S.) in one dataset and as a S.A. (*Sociedad Anonima*, the equivalent of publicly traded company in the U.S.) in the other. In the second case, it could simply happen that there are typos, abbreviations or missing words in one or both of the datasets. To deal with these issues, we first harmonize firm names in each database separately. In particular, we modify the procedure in Bessen (2009), which was designed to match US patent data with COMPUSTAT data. The procedure consists of several steps. In a first step, we get rid of special and punctuation characters and conjunctions. In a second step, we replace business structures by their acronyms. For example, *Sociedad de Responsabilidad Limitada* – the equivalent of a Limited Liability Company in the U.S. – is replaced by SRL. In this step, we also abbreviate common words in firms, such as *Exportadora* (Exporter) or *Exportaciones* (Exports), which are both replaced by EXP in this case. In a third step, we eliminate from the firm's name all the abbreviations generated in the second previous step. We do this in order to match those firms that appear with their corresponding business structure in one database but not in the other or firms that appear with different business structures in each database. In a fourth step, we rewrite all the names in lowercase and suppress the spaces before the first letter or after the last letter of the name.

Second, we use a fuzzy matching algorithm to compare the harmonized names across database.[32] The algorithm splits the names into bigrams, which are sequences of two adjacent moving characters. For example, "Frutas del Perú" would be split into "Fr ru ut ta as s_ _d de el l_ _P Pe er rú. For each standardized firm name in *ConnectAmericas*, the algorithm finds the best match (or group of matches) in the (standardized) customs data, up to a similarity score of 85%. The final step is a clerical review to validate the matches that are a 100% similar and to decide on the matches that are in a range of 85% to 99% of similarity. This last step allows us to match cases such as "ASOCIACION DE PRODUCTORES CACAO ALTO HUALLAGA" in *ConnectAmericas* data with "ASOCIACION DE PRODUCTORES CACAO ALTO HU" in the customs

[32] We use a command called *matchit* written in STATA by Julio D. Raffo.

database.

Out of the 470 firms in our dataset over the period 2014-2018, 215 (45.7%) were matched by their tax ID, 186 (39.6%) correspond to a perfect match between standardized names, and 69 (14.7%) were in a range of similarity of 85% to 99%.