

Information and Exports: Firm-Level Evidence from an Online Business Platform*

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Abstract

Lack of information is an important trade barrier. Online platforms connecting firms can reduce this barrier and thereby affect firms' exports. We examine whether this is the case by focusing on *ConnectAmericas*, a free online business platform that, by the end of 2016, connected more than 16,000 firms from almost a hundred countries. In particular, we estimate the impact of using the platform on firms' export outcomes, along both the intensive and extensive margins, exploiting data on firms' participation in this platform along with customs data from Peru for the period 2010-2016. In so doing, we apply an instrumental variables approach whereby firms' use of the business platform is instrumented with information on the distribution of emails announcing its launching by Peru's national trade promotion organization. Consistent with the interpretation of the platform as an information cost-reducing mechanism, our results suggest that *ConnectAmericas'* utilization allowed firms to expand their exports by primarily increasing the number of products they sell abroad and enlarging their buyer base.

Keywords: Information, Online Platforms, Exports, Firms

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1. Introduction

Information costs are a significant obstacle to trade (see Anderson and van Wincoop, 2004). In particular, imperfect information can play a major role in explaining why national borders still substantially impede trade in a context characterized by relatively low traditional barriers to trade such as tariffs and transport costs (see Head and Mayer, 2013). Such impediments to trade generally grow larger as distance between partners increases and accordingly familiarity decreases (see, e.g., Grossman, 1998; Huang, 2007). Specifically, firms pursuing business opportunities abroad must engage in a costly process of identifying and assessing potential commercial partners and these searches are more difficult, the more geographically dispersed are those business opportunities and potential partners (see Rangan and Lawrence, 1999; Rangan, 2000). In fact, firms themselves consistently report difficulties in identifying the initial business contact and in establishing the initial dialogue with prospective clients as major export barriers (see Kneller and Pisu, 2011; WTO, 2016).

Purely informational online business to business (B to B) platforms can reduce these information barriers by facilitating access to relevant knowledge and searches, contacts, and matchmaking among firms, without enabling payments or logistic solutions. In this paper, we investigate -for the first time to our knowledge- whether, to what extent, and how such platforms can affect firms' export outcomes. We specifically address two main questions: What are the effects of using online business platforms that reduce information and matching costs on firms' exports? What are the mechanisms behind the observed effects and, in this regard, to what extent using different kinds of information -general trade information vs. specific commercial information- matters?

In answering these questions, we focus on *ConnectAmericas*, a free online business platform, which as of December 2016, connected more than 16,000 firms from almost a hundred countries, and use Peru as our case study. The reason for choosing this country is twofold. First, as we shall discuss below, the way the platform launching was announced to firms in Peru provides a strategy to properly address the main identification threats. Second, we have access to firm-destination-level export data that cover the universe of export transactions of Peruvian firms for the period 2010-2016 along with detailed data on firms' use of the platform as well as firm-level data on location, sector affiliation, year of establishment, and year-specific trade promotion support status.

In order to identify the effects of using the platform on firms' exports, we start by applying a generalized difference-in-differences strategy that estimates the change in firms' exports allowing for varying intensity usage *relative* to that for counterparts not using the platform. In so doing, we control for observed relevant time-varying firm-level factors such as assistance by the national promotion organization and age through ex-

plicit covariates and unobserved time-varying destination-specific factors through fixed effects. In robustness checks, we also control for broader sets of confounders such as unobserved time-varying region-sector factors. Admittedly, even though these high dimensional fixed effects go a long way in absorbing factors that could lead to firms' self-selection into the platform and simultaneity, these specifications 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 and operate with the platform). We therefore implement an instrumental variables strategy whereby we instrument the actual use of the platform with the reception of an email from Peru's national trade promotion organization announcing its launching in the country. While this email was sent to (all) firms in such organization's distribution list and thus is not purely random, we argue that the email variable is a valid instrument given our specification. The reason is twofold. First, it predicts the platform's utilization. Second, it can be considered otherwise uncorrelated with exports after conditioning for all relevant explanatory variables. This can be expected the case because the estimating equation includes both firm(-destination) fixed effects, which control for all systematic differences between firms in such a list and peers that are not part of it, and a variable that captures year-specific support by the aforementioned organization, which accounts for the fact that firms assisted in the year in which *ConnectAmericas* was launched may have been more likely to be notified about it.

To preview our main findings, estimates suggest that use of the online business platform has resulted in increased firms' exports. This export increase (i) is primarily explained by access to and consumption of relevant, specific commercial information as opposed to general trade information; (ii) can be traced back to expansions along both the product and buyer extensive margins, which are exporting activities facing more severe information problems than their respective intensive margin counterparts; and (iii) is more pronounced for firms with less market-specific export experience (less information capital), in less familiar countries such as the more developed and distant OECD countries (higher informational barriers), and in destinations with larger number of firms registered with the platform (more potential connections).

Our study contributes to two main strands of the literature. First, we add to a series of papers exploring the effects of information and search frictions on international trade. In this literature, in a pioneer study, Rauch (1999) first proposed a network and search approach to international trade, which highlights that information barriers differ across groups of products. Trading heterogeneous goods in terms of characteristics and quality, impedes scanning suppliers based solely on prices and requires a costly search process which is strongly conditioned by proximity and preexisting ties. Imperfect in-

formation can also concern market conditions in the destination. Allen (2014) develops a theoretical trade model that incorporates a costly search process to learn about market conditions elsewhere and shows that information frictions can explain why regions import and export the same commodity, why price shocks are imperfectly transmitted to trading partners, and why the elasticity of trade flows to destination prices increases with the heterogeneity of producers. Structural estimation of this model using regional agricultural trade data in the Philippines reveals that information frictions are indeed quantitatively important, accounting for roughly half the observed regional price dispersion. These information frictions may also substantially affect trade by making it harder for firms to match, i.e., to find the right business partner. Chaney (2014) proposes a network model of international trade in which firms only export to markets in which they already have a contact, they search directly for new buyers and they use their existing network of contacts to search for new buyers.² Finally, Eaton et al. (2014) analyze the features of buyer-seller relationships in Colombia and develop a search model in which success in selling to a buyer serves as information about the product's demand in the market, which in turn, affects firm's incentives to search in that market.³

We extend this literature by empirically examining the implications of different types of information for firms' export outcomes. In particular, we explicitly investigate whether and to what extent general trade information (e.g., information on the export process at home, on marketing and business negotiations' strategies, on the alternative ways to ship the merchandise and the corresponding costs,; analyses on country and product market trends, and the associated data) and specific commercial information (i.e., concrete business opportunities) affect differentially firms' performance in foreign markets.

Second, we complement a number of papers that examine the implications of technologies and various institutional arrangements, informal and formal, private and public, that facilitate searches and matches between buyers and sellers and thereby reduce their implied costs.

Information and communication technologies, in general, and the internet -as prox-

²Albornoz et al. (2012) present a theoretical model where a firms' profitability is initially uncertain and positively correlated over time and across destinations. In this case, firms can learn about their profitability by entering and such an experimentation provide a rationale for the observed high failure rates in export markets. Artopoulos et al. (2013) conduct a series of case studies in Argentina from which they conclude that continuous exporters to developed countries implement a set of business practices different from those that are successful in their domestic market that are introduced by an export pioneer who possesses tacit knowledge, which is then diffused through the sector. Atkin et al. (2017) document knowledge transfers about quality improvement occurring from buyers and intermediaries to producers.

³On trade-related information and buyers see also: Mion and Opromolla (2014), Mion et al. (2016), Bernard et al. (2018a, 2018b), Blum et al. (2010), Carballo et al. (2018), Kamal and Sundaram (2016), Macchiavello and Morjaria (2015), Monarch (2014), Monarch and Schmidt-Eisenlohr (2016), and Sugita et al. (2015).

ied by various indicators-, in particular, have been shown to reduce information frictions and favor international trade.⁴ Thus, utilizing the gradual introduction of the mobile phone service throughout the fishing-specialized Indian state of Kerala, Jensen (2007) establishes that the adoption of this new communication technology by fishermen and wholesalers caused a substantial reduction in price dispersion -with a near perfect adherence to the law of one price- as well as increased consumer and producer welfare. Likewise, Steinwender (2018) exploits the introduction of the transatlantic telegraph to determine that the associated increase in the speed in information flows between the US and the UK resulted in lower mean and volatility of cross-Atlantic price differences and larger average trade flows. Freund and Weinhold (2002, 2004) find that the use of the internet as proxied by the number of web hosts in a country enhances growth of both service and merchandise trade, respectively.⁵ More recently, a few studies have started to present evidence on the impact of the internet on firms' export outcomes. For instance, Kneller and Timmis (2016) make use of the spatial variation in broadband internet availability in the UK -as determined by the country's historic telephone network- and observe that use of broadband internet raised the propensity of business services firms to export. Similarly, taking advantage of the rollout of the internet across Chinese provinces from 1999 to 2007, Fernandes et al. (2017) find that it had a positive impact on both firms' export and overall performance (i.e., output, productivity, employment).⁶

More specifically, online consumer-to-consumer (C to C) or business-to consumer (B to C) platforms can help reduce search costs over space and, in particular, reduce the negative incidence 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.⁷ Exploiting the introduction of eBay's global shipping program through both an initial random pilot and its later gradual rollout across importing countries, Hui (2016) shows that the trade-increasing effect of this online platform is strengthened when intermediation services -customs clearance and international shipping handling-

⁴Fink et al.(2005) present evidence suggesting that communication costs matter for trade, particularly when differentiated goods are involved

⁵Lin (2015) arrives at a similar result using the number of internet users as an alternative proxy, whereas Choi (2010) also finds that internet stimulates service trade using a larger sample of countries and a longer time series. Blum and Goldfarb (2006) conclude that gravity holds in the case of digital products consumed over the internet without trading costs based on their analysis of internet activities in a sample of US households.

⁶A growing number of papers estimate the relationship between internet usage and firms' productivity. These include Grimes et al. (2012), Bertscheck et al. (2013), Akerman et al. (2015), Clarke et al. (2015), Haller and Lyons (2015), and Paunov and Rollo (2015).

⁷Goldmanis et al. (2010) examine how e-commerce has affected the structure of retail industries.

are integrated. In a similar vein, Couture et al. (2018) 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. This program involved both the construction of warehouses as logistical nodes for rural parcel delivery near the urban center along with fully subsidization of transport between the county's city center to and from the participating villages to reduce trade costs and the installation of e-commerce terminals along with a manager assisting consumers in a central village location to lower information costs, in all cases in villages that were already connected to the internet. Findings from the examination of this program indicate that e-commerce led to sizable but heterogeneous gains in households' and villages' real incomes and that these gains primarily come from overcoming the logistic barriers. Finally, Chen and Wu (2017) focus instead on China's T-shirt exports on a different online platform, *Alibaba.com*, to shed light on an important specific aspect related to the role of information in international trade, namely, the value of reputation.⁸ In conventional offline trade, exporters intending to enter a new market or expand foreign sales within an already served market are preceded by their reputation, which, in absence of an identifiable brand name, largely depends on the perception of country of origin (see Chisik, 2003). This is especially relevant for firms from developing countries, whose products are more likely to be perceived as technologically less advanced and of poorer quality than those of peers from developed countries (see, e.g., Chiang and Masson, 1988; Han and Terpstra, 1988; Egan and Moody, 1992; and Hudson and Jones, 2003). Online platforms such as *Alibaba.com* address this issue by allowing buyers to share information on exporters' quality and accordingly observe their reputation. Chen and Wu (2017)'s results suggest that better reputation based on ratings and substances of comments translates into larger export revenues, larger export volumes, and a larger number of destinations and buyers.

In general, in this literature, firm-level evidence is scarce and, when available, firms' use of the technology or specifically the platform is observed or their detailed export data from customs but not both. This creates several methodological challenges since it is unknown either whether firms or consumers are utilizing these media or whether these are pure or mixed online exporters. In our dataset we instead observe both and thus clearly establish which firms are using the platform and which not, and even with which intensity and purpose, 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 (B to B) and excludes the transactional components (i.e., payments and logistics),

⁸Cabral and Hortacsu (2010) study the implications of seller reputation using data from eBay.

so that we in principle identify in a cleaner way the effects of the associated reduction in information costs, in general, and that of acquiring knowledge about foreign markets and of searching and directly matching with buying firms, in particular.

Finally, our paper also relates to the literature on institutional arrangements aimed at reducing information barriers. Thus, in the public realm, export promotion policies are an ubiquitous practice around the world (see Lederman et al., 2010; Volpe Martincus, 2010). These policies can be mainly seen as information brokerage and facilitation services which involve provision of data on the general export process and on specific markets and overseas business contacts, dissemination of information on domestic firms products and services, and assistance in the preparation and follow-up of firms participation in international marketing events such as fairs and missions. These activities are likely to reduce the fixed costs that firms incur when penetrating a new foreign market and when searching for new customers in existing export markets. Available evidence from various studies primarily using firm-level export and trade promotion support status data consistently indicates that such a support has a positive and significant effect on firms' exports (see, e.g., Volpe Martincus and Carballo, 2008, for Peru; and van Biesebroeck et al., 2016, for a survey of this literature).

In the private sphere, such institutional arrangements have typically consisted of informal immigrant networks and formal intermediaries. As for the former, Rauch and Trindade (2002) show that the Chinese network has a trade increasing effect which is larger for differentiated goods than for homogeneous goods. The difference in observed impacts between these two classes of goods may be taken to represent the value of market information, matching, and referral services provided by the network, provided that the trade expanding effect of the network on the latter group of goods can be interpreted as the value of the network to informal contract enforcement.⁹ As for the latter, a growing set of papers analyze different aspects of the role of intermediaries in international trade across several countries.¹⁰ Thus, Feenstra and Hanson (2004) examine the role of Hong Kong in intermediating trade between China and the rest of the world and find that, net of customs, insurance, and freight charges, Chinese goods are much more expensive when they leave Hong Kong than when they enter, where the mark-up might be seen as the value of information cost-reducing services provided by intermediating middlemen. Using data from China, France, Italy, and Sweden, Ahn et

⁹Similar findings have been reported for vertical keiretsu, i.e., providers looking for export opportunities benefit from having an assembler abroad whose characteristics they know (see, e.g., Belderbos and Sleuwaegen, 1998; and Head and Ries, 2001). Looking at international imports and exports of French regions, Briant et al. (2014) conclude that immigrant network can help promote imports of simpler goods from foreign countries with weak institutions.

¹⁰Ahn et al. (2011), Antràs and Costinot (2010, 2011), Felbermayr and Jung (2011), Crozet et al. (2013), and Akerman (2018) present theoretical models on intermediaries.

al. (2011), Crozet et al. (2013), Bernard et al. (2015), and Akerman (2018), respectively, report that the share of intermediaries in a country's trade increases with the distance to the destination and the fixed costs to trade in that market, and decreases with its size as proxied by the respective GDP.

The remainder of this paper is organized as follows. Section 2 introduces the on-line business platform *ConnectAmericas*. Section 3 describes the dataset and presents descriptive evidence. Section 4 explains the empirical strategy. Section 5 discusses the estimation results, and Section 6 concludes.

2. *ConnectAmericas*: An Online Platform to Learn and Connect

ConnectAmericas.com is a free social media platform developed by Inter-American Development Bank (IDB), Google, DHL, VISA and *Alibaba.com* with the purpose of facilitating firms' internationalization. To do so, it provides access to relevant information but neither allows for direct transactions among firms nor incorporates the respective logistic solutions. As such, *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; and information about support available to firms in the countries where they are operating.

The *Connect* function instead provides firms with specific commercial information. Thus, it allows firms to 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, to share relevant information with their peers, to ask a question to the community, or to reply to posts by others; be notified about *business opportunities*, which consist of purchasing announcements by large firms and governments, and apply to these opportunities through the platform; obtain information about face-to-face business events, some of which are organized by *ConnectAmericas*; and search for a company's profile and interact with members of its staff, either through a messaging system provided by the platform or through e-mail.

ConnectAmericas was launched in 2014. By the end of 2016 16,317 firms from 97 countries had registered with the platform. Of these firms, Peru, our case study, accounted for 10% of this total, being the fourth country with more registered firms, after Brazil, Colombia, and Mexico (see Figure 1 and Table 1).

3. Dataset and Descriptive Analysis

Our main dataset consists of six databases for Perú over the period 2010-2016 which were kindly provided by the *ConnectAmericas* team, Perú's tax and customs agency (SUNAT), and Perú's national trade promotion organization (PROMPERU).¹¹ The first database includes transaction-level export data from customs. Specifically, each record includes the firms tax ID and name, the product code (10-digit HS), the destination country, and the export value in US dollars. The second database complements these data with information on the foreign buyers of Peruvian exports, which can be easily merged with the former database since both have several fields in common.

The third database reports firms' activities in the *ConnectAmericas*' platform, including the date at which firms created their accounts and their country -these data are available since the platform's starting date in 2014- and the number of their visits to the *Learn* and *Connect* sections of the platform and thereby on the intensity of use of the associated information services -these data are available since 2016-. Firms are identified by their names in this database. In order to match their names there with those in the customs export database we use standard record-matching techniques.¹²

While *ConnectAmericas* was operating since 2014, in Peru it was not formally launched until 2016. This launching was announced through an email circulated by PROMPERU to all firms in its distribution list. The fourth database precisely consists of this list of firms that received the notification about the platform. The fifth database contains annual firm-level information on explicit trade promotion assistance by PROMPERU. Finally, the sixth database has data on firms' characteristics such as location (i.e., department and provinces), sector of activity (i.e., 4-digit ISIC), and year of establishment. The latter three databases were also merged with the customs database as they share the same firms' identifiers.

Figure 2 presents the distribution of the (log) firm-destination export values for firms joining *ConnectAmericas* in 2016 and that for firms that do not operate with it in common destinations, in 2013. According to a Kolmogorov-Smirnov test, these distributions do not significantly differ from each other, thus suggesting that exports of users and non-users did not behave differently before the actual use of the platform.

Figure 3 shows the evolution of the number of Peruvian exporting firms registered with *ConnectAmericas* from 2013 to 2016. This number experienced a more than fourfold increase between 2015 and 2016 (from 32 to 145). It is worth noting that most of these new registered firms received the email from PROMPERU announcing the launching of

¹¹The Appendix includes a description of PROMPERU and its trade promotion activities.

¹²A detailed explanation of the name-matching methodology is provided in the Appendix.

the platform. Figure 4 further reveals that, among firms operating with *ConnectAmericas*, those that got that email made a more intensive use of the platform and its information services.

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 the logarithm of firm f exports to destination d :

$$\ln X_{fd} = \omega \mathbb{I}(\text{CA})_f \cdot \ln \text{Distance}_d + \kappa \mathbb{I}(\text{noCA})_f \cdot \ln \text{Distance}_d + \sum_j \tau_j \Lambda_d^j + \iota_f + v_{fd} \quad (1)$$

where $\mathbb{I}(\text{CA})_f$ and $\mathbb{I}(\text{noCA})_f$ are binary indicators that take the value of one if the firm f uses *ConnectAmericas* or does not use *ConnectAmericas*, respectively, and zero otherwise; $\Lambda_d = \{\Lambda_d^1, \dots, \Lambda_d^j\}$ is the traditional set of trade enhancers and inhibitors such as GDP, common border, common language, and regional trade agreements; ι_f is a set of firm fixed effects; and v is the error term. Estimates of Equation (1) as obtained on cross-sectional data for 2016 are reported in Table 2. As expected, the negative effect of distance is significantly smaller (in absolute value) for firms operating in the platform.

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.

4. Empirical Methodology

We aim to estimate the effects of using the information services provided by *ConnectAmericas* on firms' exports. This requires to properly account for other relevant observed and unobserved factors such as firms' age, use of trade promotion assistance, and foreign demand shocks that may affect these sales and utilization of the platform. In so doing, we use the following baseline empirical model of firms' exports:

$$\ln X_{fdt} = \alpha \text{CA}_{ft} + \beta \ln \text{Age}_{ft} + \phi \text{EPA}_{ft} + \delta_{fd} + \gamma_{dt} + \varepsilon_{fdt} \quad (2)$$

where $\ln X_{fdt}$ is the natural logarithm of the value of exports a firm f to destination country d in year t and CA_{ft} denotes the number of days firm f visited *ConnectAmericas*'s website in the year in question. The coefficient on CA_{ft} , α , is accordingly our parameter of interest. If $\alpha > 0$ ($\alpha = 0$), then increased use of 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 2016, the last available year of our export data. Given that data on website'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, as we shall see below, that results are essentially the same if we keep those firms in the sample. This is hardly surprising because, as shown in Section 3, only a few firms had registered in *ConnectAmericas* prior to 2016.

The remaining terms of Equation (2) correspond to control variables. Thus, $\ln Age_{ft}$ is the natural logarithm of the firm f 's age computed as the difference between firm f 's starting year and year t plus one, which proxies for firm's experience and performance (see, e.g., Stigler, 1958); EPA_{ft} is a binary indicator that takes the value of one if firm f was assisted by PROMPERU in year t and zero otherwise, which controls for both the direct impact of trade support on firms' exports (see, e.g., Volpe Martincus and Carballo, 2008) and for its possible effect on firms' registration with *ConnectAmericas* (e.g., firms using PROMPERU's services might be more likely to have been informed about the platform); δ_{fd} is a set of firm-destination fixed effects and γ_{dt} is a set of destination-year fixed effects, which control for both time-invariant firm-destination factors such as firms' average size, productivity, and specific knowledge about the destination market over the sample period and distance to this market and for time-varying destination factors such as average transport costs, exchange rates, tariffs, and preferential trade agreements; ε is the error term.

Based on Equation (2), the effect of *ConnectAmericas* on firm-destination exports, α , is identified through the variation over time in the number of visits to the respective website, conditional on the covariates and the sets of fixed effects. The latter account for multiple confounding 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* and promote a more intensive use of it. If this were case, we would be overestimating the actual true impact of the platform. Alternatively, firms with weaker export performance might resort more frequently to the platform to boost their sales, in which case we would underestimate its causal effect.

In order to isolate a source of variation in the visits to the platform that is exogenous with respect to exports, we exploit the information on the distribution of emails announcing the launching of *ConnectAmericas*. More specifically, we instrument firms' number of visits to the platform with the reception of such emails. The first stage equation is accordingly as follows:

$$CA_{ft} = \theta Email_{ft} + \sigma \ln Age_{ft} + \rho EPA_{ft} + \phi_{fd} + \psi_{dt} + \mu_{fdt} \quad (3)$$

where $Email_{ft}$ is a binary indicator that takes the value of one if firm f received such an email from PROMPERU in year t and zero otherwise; ϕ_{fd} is a set of firm-destination

fixed effect; ψ_{dt} is a set of destination-year fixed effects; and μ is the error term.

To be a valid instrument, the email variable should predict the number of days with visits to the website, but it should be otherwise uncorrelated with exports. This involves two conditions. First, reception of the email must be correlated with registration and use of the website once other relevant variables have been netted out. This is exactly what the evidence presented in Section 3 suggests: firms notified of the platform are more likely to use it and more intensively. Second, the email must be uncorrelated with the error term once conditioned on all other explanatory variables. In other words, it must be exogenous, which requires properly controlling for factors that influence exports and are correlated with use of the website. This is precisely what the fixed effects and the covariates do, particularly the firm(-destination) fixed effects which control for systematic differences between firms included and not included in PROMPERU's distribution list and the trade promotion indicator which controls for the fact that firms that were informed about the platform could have been more likely to benefit from assistance in this regard in the year in question.¹³ While the exclusion restriction cannot be formally tested because there is only one instrument for the endogenous variable, this restriction is fulfilled by definition since the email cannot be anticipated to affect foreign sales through channels other than the use of the website itself. Moreover, notice that 2SLS does not assume anything specific regarding the nature of the endogenous variable so it can accommodate a count variable like ours -i.e, number of days visiting the website-. This is the case because the first stage (or reduced form) of CA is just a linear projection.

The baseline equations assume that the effect of *ConnectAmericas* on exports is symmetric across firms and destinations. However, there are reasons to believe that these effects may differ among groups of firms and destinations, in which case such a restriction would not hold. Thus, for instance, impacts can be larger for firms without export experience in the destination market and thus facing larger information barriers or in less familiar destinations such as OECD countries. Hence, we also generalize this equation to explore the existence of heterogeneous effects across those groups as follows:

$$\ln X_{fdt} = \sum_i \alpha_i \Phi_i CA_{ft} + \beta \ln Age_{ft} + \phi EPA_{ft} + \delta_{fd} + \gamma_{dt} + \varepsilon_{fdt} \quad (4)$$

where i indexes the groups of firms or destination countries; and Φ is the corresponding group indicator.

¹³It is also worth stressing that our estimation results remain exactly the same when we additionally include one or two lags of the trade promotion indicator to account for the fact that firms supported in previous years may have also been more likely to be informed about *ConnectAmericas*. These results are available from the authors upon request.

In the empirical analysis below, we also examine the impact of *ConnectAmericas* on the firm-destination export extensive margin. To do so, we estimate the following linear probability model of exports (along with the respective first stage):

$$Y_{fdt}^X = \lambda CA_{ft} + \eta \ln Age_{ft} + \zeta EPA_{ft} + \pi_{fd} + \chi_{dt} + \nu_{fdt} \quad (5)$$

where Y_{fdt}^X is a binary indicator that takes the value of one if firm f exports to destination country d in year t and zero otherwise; π_{fd} is a set of firm-destination fixed effects; χ_{dt} is a set of destination-year fixed effects; and ν is the error term.

Finally, our variable of interest, CA_{ft} , varies across firms over time and estimation of Equations (1)-(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.

5. Estimation Results

5.1. Baseline Estimates

Table 3 presents OLS and IV estimates of Equation (2) along with those of Equation (3) and the respective reduced-form for the latter, both for the entire sample and for the restricted sample excluding those firms that registered and started to operate with the platform before 2016, and for which we do not have data on their activity therein (see Section 3). Based on this specification which controls for time-invariant firm-destination and time-varying destination factors, both OLS and IV estimates concur in that use of the website has been associated with larger firms' exports. In particular, according to the former, these exports increase by 1.8%-1.9% in response to one additional day working with platform. The sample median of firm-destination exports for 2016 is USD58,042 so this would imply, at the median, almost USD1,050 additional exports per extra day operating with the website. The instrumental variables estimate of the coefficient of interest is larger than the ordinary least squares counterpart. This is precisely what one would expect if firms with larger exports tend to use less intensively the platform, as it appears to be the case in our data (see Figure 5). This could happen because they have access to other means to reach out potential customers. The relevant F-test statistic is above 10 (Staiger and Stock, 1997), thus indicating that the email is correlated with the use of the platform. In fact, the first stage estimates reveal that, conditional on the fixed effects, the email is its main determinant. As for the exclusion restriction, as discussed above, it holds by definition as such an email can only affect exports through the utilization of the platform once other relevant factors are controlled for through

included covariates and fixed effects. Consistently, the estimated intention-to-treat effect is positive: the reception of the email is positively and significantly correlated with firms' exports. The estimated coefficients on the control variables have the expected signs. Age and trade promotion support appear to positively affect exports.¹⁴ It is worth mentioning here that results remain exactly the same if the baseline specification is extended to include additional time-varying firm-level controls that can be considered proxies for productivity such as the number of years the firm has been exporting, the number of products (lagged), and the number of destinations (lagged).¹⁵

5.2. Robustness

Even though there seems to be a clear case for a causal interpretation of our results, we next present further supporting evidence that rule out other competing explanations, which is particularly relevant for our OLS estimates. Thus, while we have included comprehensive sets of fixed effects, they may be not enough to control for other unobserved factors that may have influenced firms exports. For instance, firms using *ConnectAmericas* may be located in different regions and thus have to incur in different domestic transport costs to reach the exiting ports/airports/land borders (see, e.g., Volpe Martinus et al., 2017) or be affiliated to different sectors which may receive different policy treatments than their non-user counterparts. Furthermore, firms operating with the platform may sell abroad different products that those not registered therein and hence be exposed to different demand shifts across countries and, specifically, different changes in international transports, tariffs, and trade costs associated with customs and other administrative procedures across the various destinations (see, e.g., Volpe Martinus et al., 2015). To address these concerns, we have estimated alternative specifications of Equation (2) -and Equation (3)- including department-year/province-year and 2-digit ISIC sector-year/4-digit ISIC sector-year fixed effects and their combinations in addition to firm-destination and destination-year fixed effects.¹⁶ Furthermore, we have also estimated another variant of Equation (2) that incorporates firm-product-destination and product-destination-year fixed effects on on data at the firm-product-destination-year level.¹⁷ Estimates of these alternative specifications are reported in Columns 1-6 and

¹⁴However, note that the positive effect of trade promotion assistance losses its significance in the IV estimation.

¹⁵These additional results are available from the authors upon request.

¹⁶In our dataset, there are 57 2-digit ISIC sectors, 257 4-digit sectors, 25 departments, and 110 provinces.

¹⁷We report here estimates of a specification including firm-product-destination and HS-2 digit product-destination-year fixed effects. Results are similar if we include HS-4 digit product-destination-year fixed effects or HS-6 digit product-destination-year fixed effects instead of HS-2 digit product-destination-year fixed effects. These alternative results are available from the authors upon request.

Column 7 of Table 4, respectively. These estimates essentially corroborate our initial findings.

Moreover, we have carried out a placebo test. More specifically, use of the website should not cause any gap between *ConnectAmericas* and non-*ConnectAmericas* exports before the launching of the website altogether. The plausibility of this identifying assumption can be assessed by regressing current t exports in future $t + 3$ use of the platform. In particular, we use data over the period 2010-2013 in which *ConnectAmericas* was not operative to conduct a falsification exercise whereby we assume that firms visiting the website in 2016 did it in 2013. The placebo estimates are shown in the upper panel of Table 5 along with those for the respective real use, as obtained from the same firm-destination combinations. Reassuringly, none of the former estimated coefficients are significantly different from zero, but the latter are.

Similarly, if our hypothesis is right, then the impact of the platform should be larger for export flows from firms registering early in the year compared to those late in the year. Specifically, *ConnectAmericas* should have virtually no effect on foreign sales for firms that started to operate with the website in the last month of the year. In order to explore this, we allowed the variable of interest to have differential impacts on exports depending on whether the firm joined the platform in such a quarter or not through interactions with two binary indicators identifying the month of registration (December and non-December). The estimates of this variant of Equation (4) are reported in the lower panel of Table 5. As expected, these estimates indicate that use of the website did not translate in additional exports for firms becoming members in December.

Finally, we have also examined the existence of potential general equilibrium effects in the form of information spillovers from trade activities by *ConnectAmericas* firms and their implications for the estimates of interest. Assuming that, if present, these externalities would be specific to the regions and sectors in which firms operate, we have re-estimated Equation (2) on a sample in which the control group is restricted to firms which belong to the same region-sector pairs as *ConnectAmericas* firms. Consistent with the existence of those localized specific information spillovers, the estimated coefficient on *CA* is smaller than the baseline and the more so the more narrowly defined are the regions and sectors (i.e., Department-2 digit ISIC Sector vs. Province-4 digit ISIC Sector, but remains positive and significant).

5.3. Mechanisms of the Effects

In this subsection we explore the mechanisms behind the observed effects and the channels through which they arise. For the sake of brevity, only OLS estimates will be

presented here.¹⁸

As explained in Section 2, through their functions *Learn* and *Connect*, *ConnectAmericas* provides firms with both general trade information (i.e., explanation of export procedures, product-destination level export and import data) and specific commercial information (i.e., concrete business opportunities, browsing firms' profile and communicate with them), respectively. Given their different nature and purposes, the two sets of information are likely to affect differently firms' exports. Thus, while general trade information can help build firms' overall trading capabilities, specific commercial information can have a more direct and immediate impact on firms' foreign sales as it facilitates matchmaking with potential buyers and the transformation of the associated leads into concrete exports. We evaluate this mechanism by exploiting data on firms' activities in *ConnectAmericas* that enable to distinguish visits within the platform that correspond to each of the aforementioned information services and accordingly estimating by both OLS and IV a variant of Equation (2) where the main explanatory variable is the difference between the number of days the firm visited the *Connect* section and the number of days the firm visited the *Learn* section. The estimates of this equation are presented in Table 6. These estimates reveal, as expected, that the relative intensity in the use of the *Connect* section is positively associated with firms' exports.¹⁹

In the same vein, the potential to generate additional exports in given destinations is likely to be correlated with the number of firms that can be reached through the platform in these markets. We assess whether this is the case by specifying and estimating a variant of Equation (4) which allows for heterogeneous effects across destinations depending on the number of firms registered in *ConnectAmericas*. In particular, this specification includes an interaction term between the website visits variable and a binary indicator that takes the value of one if the number of *ConnectAmericas* in the importing country is at or above the median and zero otherwise.²⁰ Estimates of this equation (along with those of modified versions based on alternative thresholds) are reported in the upper panel of Table 7. These estimates indicate that indeed effects are larger the more firms operate with the platform.

The last two columns of the table provides further evidence on the role of this platform as an information barrier-reducing mechanism by distinguishing between destinations based their degree of familiarity for Peruvian firms as proxied by OECD and

¹⁸IV estimates are available from the authors upon request.

¹⁹We should recall herein that, due to data constraints, our sample only includes exporting firms. In a second stage, we plan to incorporate non-exporting firms for which this general trade information might make a difference.

²⁰The median number of firms in *ConnectAmericas* across destinations is 4 when considering all countries and 8 when only considering those countries with more than one registered firm.

non-OECD countries and between firms with and without export experience in the specific market.²¹ Estimates of the respective variants of Equation (4), which are shown in the second panel of Table 7, suggest that the impact of *ConnectAmericas* is actually only significant in the less familiar OECD markets and for inexperienced firms.

The channels of the effects can also inform their mechanisms. Informational problems tend to be more severe on the extensive margin, i.e., when starting to export a new product or selling to a new buyer than on the intensive margin, i.e., when expanding operations on products already traded or to buyers already served. Amelioration of these informational problems through the use of the platform is therefore likely to have a stronger effect in the former cases. To disentangle the channels, we estimate the impact of using *ConnectAmericas* on the number of products, the number of buyers, and the average exports per product and buyer, based on Equation (1). The estimates are presented in lower panel of Table 7. According to these estimates and in line with our expectations, the expansion of firms' exports associated with the utilization of the platform takes place primarily along the extensive margin. More specifically, it can be traced back to an increase in the number of products sold and in the number of buyers in the destinations.²² In sum, the positive impact of *ConnectAmericas* on firms' exports mainly comes from an increase in the number of products that firms sell to each market and an increase in the number of buyers in those markets.

5.4. *The Impact on the Extensive Margin*

So far the analysis has focused on the effect of the online business platform on the firms' export intensive margin (i.e., existing flows at the firm-destination level). In addition, making use of its information services may have helped some firms to enter into new destinations. Hence, we have also examined the effects of these services on the firm-destination extensive margin. Thus, we have estimated Equation (5) on a sample consisting of all firm-destination combinations over the period 2013-2016 for those firms that exported in 2013 and were established that year or before. Table 8 presents both OLS and IV estimates of this equation along with those of the first stage for the latter.²³ As with the intensive margin, both estimates coincide in suggesting that the

²¹We consider firms with export experience those that exported before the beginning of our sample period (2013) to the specific destination. The definition of OECD used in this estimation does not include the Latin American member countries (i.e., Chile and México).

²²The number of observations is smaller than in the baseline estimation because information on buyers is not available for all firm-destination-year flows. All our results hold also in this sample

²³Note that the number of observations is substantially larger than in our original estimations because we are now including all the zeroes at the firm-destination-year level.

use of *ConnectAmericas* has resulted in a higher probability to add a new destination. In particular, based on the OLS estimate, each additional day operating with the platform increase the probability to enter a new market by 0.07%. It is worth mentioning that these results are robust to the inclusion of broader sets of fixed effects paralleling those specifications whose estimates are reported in Table 4.²⁴

6. 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 microeconomic evidence that this is indeed the case. In so doing, we use, for the first time to our knowledge, firm-level data on the intensity of utilization of a pure B to B non-transactional online platform that provides both general trade information and specific commercial information and disaggregated firm-level export data covering the whole population of exporting firms in a country, and address potential endogeneity of intensity of platform usage using an email announcing its launching as an instrument. In particular, both OLS and IV estimates suggest that use of the platform resulted in additional exports, both along the intensive and extensive margins. This positive effect on firms' exports is primarily explained by the consumption of specific commercial information services, can be traced back to expansions along the product and buyer margins, and is stronger for less familiar markets and destinations with more firms operating in the platform and thus with larger matching potentials.

²⁴The F-test statistics declines below 10 in the more demanding specifications but estimates are similar to the respective baseline.

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Table 1

Number of Firms and Countries in <i>ConnectAmericas</i>		
Year	Number of Firms	Number of Countries
2014	2,676	56
2015	5,922	66
2016	16,317	97

Source: Authors' calculations based on data from *ConnectAmericas*.

The table reports the evolution of firms registered in *ConnectAmericas* and that of the number of countries with at least one firm using the platform from its launching in 2014 to 2016.

Table 2

The Impact of Distance		
ConnectAmericas Firms vs. Non-ConnectAmericas Firms		
I(CA) x Distance	-0.165 (0.279)	-0.173 (0.280)
I(noCA) x Distance	-0.571** (0.230)	-0.580** (0.230)
GDP	0.269*** (0.0597)	0.267*** (0.0590)
Contiguity	0.149 (0.235)	0.162 (0.219)
Common Language	0.0487 (0.225)	0.0617 (0.228)
RTA	0.0628 (0.148)	0.0294 (0.174)
GDPpc		0.0270 (0.0721)
I(CA) x Distance - I(noCA) x Distance=0	3.190	3.196
[p-value]	[0.002]	[0.002]
Firm Fixed Effect	Yes	Yes
Observations	20,749	20,749
R²	0.506	0.506

Source: Authors' calculation based on data from COMTRADE, CEPII, WTO, Baier et al. (2014), Kohl et al. (2016), and *ConnectAmericas*.

The table reports estimates of Equation (1) on data for 2016. The dependent variable is the natural logarithm of export value at the firm-destination level. The explanatory variables are an interaction term between a binary indicator that takes the value of one if the firm uses *ConnectAmericas* and zero otherwise and the natural logarithm of distance to the destination ($I(CA) \times Distance$); an interaction term between a binary indicator that takes the value of one if the firms does not use *ConnectAmericas* and zero otherwise and the natural logarithm of distance to the destination ($I(noCA) \times Distance$); the natural logarithm of the destination's GDP (GDP); a binary indicator that takes the value of one is the destination shares a border with Peru and zero otherwise ($Contiguity$); a binary indicator that takes the value of one is the destination has the same official language and zero otherwise ($Common Language$); a binary indicator that takes the value of one is the destination has a trade agreement with Peru and zero otherwise (RTA); and the natural logarithm of the destination's GDP per capita ($GDPpc$). Firm fixed effects are included (not reported). Standard errors clustered by country are reported in parentheses below the estimated coefficients. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 3

The Impact of <i>ConnectAmericas</i> on Firms' Exports								
Baseline Specification								
	All <i>ConnectAmericas</i> Firms				Firms Registering in <i>ConnectAmericas</i> in 2016			
	OLS	Reduced-Form	First Stage	IV	OLS	Reduced-Form	First Stage	IV
CA	0.018*** (0.005)			0.320*** (0.114)	0.019*** (0.006)			0.383*** (0.142)
EPA	0.057*** (0.021)	0.057*** (0.021)	0.047 (0.086)	0.042 (0.033)	0.059*** (0.021)	0.060*** (0.021)	0.067 (0.086)	0.034 (0.039)
Age	0.498*** (0.045)	0.521*** (0.046)	0.165 (0.160)	0.468*** (0.064)	0.499*** (0.045)	0.521*** (0.046)	0.186 (0.156)	0.450*** (0.070)
Email		0.151*** (0.042)	0.474*** (0.109)			0.148*** (0.042)	0.386*** (0.095)	
F-Statistics			18.96				16.41	
Firm-Destination Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	78,247	78,247	78,247	78,247	77,414	77,414	77,414	77,414

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

The table reports OLS and IV estimates of Equation (2) along with estimates of Equation (3) and those of the respective reduced-form equation, both when including all firms registered in *ConnectAmericas* regardless the year in which they joined the platform (left panel) and when considering only those firms that started use the website in 2016 (right panel). The sample period is 2013-2016. Equation 2 (Columns 1, 4, 5, and 8): The dependent variable is the natural logarithm of export value at the firm-destination-year level. The explanatory variables are the number of days the firm visited *ConnectAmericas* website (CA); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (EPA); the natural logarithm of the firm's age (Age). Reduced-Form Equation (Columns 2 and 6): The dependent variable is the natural logarithm of export value at the firm-destination-year level. The explanatory variables are a binary indicator that takes the value of one is the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise (Email); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (EPA); the natural logarithm of the firm's age (Age). Equation 3 (Columns 3 and 7): The dependent variable is the number of days the firm visited *ConnectAmericas* website (CA). The explanatory variables are a binary indicator that takes the value of one is the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise (Email); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (EPA); the natural logarithm of the firm's age (Age). Firm-destination fixed effects and destination-year fixed effects are included in all cases (not reported). Standard errors clustered by firm are reported in parentheses below the estimated coefficients. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 4

The Impact of *ConnectAmericas* on Firms' Exports

Alternative Specifications								
OLS								
CA	0.022***	0.019***	0.020***	0.024***	0.018**	0.022**	0.012**	
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.011)	(0.005)	
EPA	0.060***	0.059***	0.039*	0.040*	0.030	0.035	0.009	
	(0.021)	(0.0210)	(0.0211)	(0.022)	(0.022)	(0.025)	(0.021)	
Age	0.508***	0.499***	0.553***	0.553***	0.581***	0.586***	0.494***	
	(0.045)	(0.045)	(0.046)	(0.047)	(0.048)	(0.051)	(0.048)	
First Stage								
EPA	0.081	0.067	0.055	0.083	0.083	0.107	0.030	
	(0.086)	(0.086)	(0.093)	(0.096)	(0.096)	(0.106)	(0.058)	
Age	0.219	0.186	0.172	0.193	0.188	0.222	-0.032	
	(0.164)	(0.156)	(0.152)	(0.146)	(0.144)	(0.161)	(0.112)	
Email	0.453***	0.386***	0.448***	0.419***	0.348***	0.284***	0.223***	
	(0.113)	(0.095)	(0.129)	(0.125)	(0.107)	(0.101)	(0.067)	
IV								
CA	0.347***	0.383***	0.318**	0.395**	0.406**	0.525**	0.588**	
	(0.124)	(0.142)	(0.130)	(0.155)	(0.177)	(0.246)	(0.298)	
EPA	0.033	0.034	0.022	0.009	-0.003	-0.020	-0.008	
	(0.036)	(0.039)	(0.035)	(0.045)	(0.047)	(0.064)	(0.041)	
Age	0.457***	0.450***	0.516***	0.498***	0.524***	0.491***	0.529***	
	(0.067)	(0.070)	(0.060)	(0.067)	(0.068)	(0.088)	(0.079)	
F-Statistics	17.94	18.96	12.61	12.74	10.79	9.29	10.93	
Firm-Destination Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	No	
Year Fixed Effect	Yes	No	No	No	No	No	No	
Destination-Year Fixed Effect	No	Yes	No	Yes	Yes	Yes	No	
Department-Year Fixed Effect	No	No	Yes	No	No	No	No	
2 Digit ISIC Sector-Year Fixed Effect	No	No	Yes	No	No	No	No	
Department-2 Digit ISIC Sector-Year Fixed Effect	No	No	No	Yes	No	No	No	
Province-Year Fixed Effect	No	No	No	No	Yes	No	No	
4 Digit ISIC Sector-Year Fixed Effect	No	No	No	No	Yes	No	No	
Province-4-Digit ISIC Sector-Year Fixed Effect	No	No	No	No	No	Yes	No	
Firm-Product-Destination Fixed Effect	No	No	No	No	No	No	Yes	
2 Digit HS Product-Destination-Year Fixed Effect	No	No	No	No	No	No	Yes	
Observations	77,414	77,414	77,414	77,414	77,414	77,414	284,920	

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

The table reports OLS and IV estimates of alternative specifications of Equation (2) along with estimates of Equation (3). The sample period is 2013-2016. Equation 2 (first and third panels): The dependent variable is the natural logarithm of export value at the firm-destination-year level (Columns 1-6) and the natural logarithm of export value at the firm-product-destination year level (Column 7). The explanatory variables are the number of days the firm visited *ConnectAmericas* website (*CA*); a binary indicator that takes the value of one if the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Equation 3 (second panel): The dependent variable is the number of days the firm visited *ConnectAmericas* website (*CA*). The explanatory variables are a binary indicator that takes the value of one if the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise (*Email*); a binary indicator that takes the value of one if the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Firm-destination fixed effects and year fixed effects are included in the first column; firm-destination fixed effects and destination-year fixed effects are included in the second column; firm-destination fixed effects, destination-year fixed effects, department-year fixed effects, 2-digit ISIC sector-year fixed effects are included in the third column; firm-destination fixed effects, destination-year fixed effects, department-2-digit ISIC sector-year fixed effects are included in the fourth column; firm-destination fixed effects, destination-year fixed effects, province-year fixed effects, 4-digit ISIC sector-year fixed effects are included in the fifth column; firm-destination fixed effects, destination-year fixed effects, province-4-digit ISIC sector-year fixed effects are included in the sixth column; and firm-product-destination and 2 HS digit product-destination-year fixed effects are included in the seventh column (not reported). Standard errors clustered by firm are reported in parentheses below the estimated coefficients. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 5

The Impact of <i>ConnectAmericas</i> on Firms' Exports						
Placebo Exercise and Timing of the Effects						
Placebo Exercise						
	Placebo <i>ConnectAmericas</i> (2010-2013)			Baseline (Same Sample)		
	OLS	First Stage	IV	OLS	First Stage	IV
CA	0.005 (0.007)		0.0379 (0.185)	0.021*** (0.005)		0.362** (0.165)
EPA	0.064*** (0.024)	0.0563 (0.051)	0.062** (0.026)	0.056*** (0.022)	0.038 (0.067)	0.043 (0.033)
Age	0.465*** (0.048)	0.066 (0.104)	0.463*** (0.048)	0.495*** (0.051)	0.187 (0.154)	0.441*** (0.072)
Email		0.403*** (0.100)			0.377*** (0.087)	
F-Statistics		16.34			18.78	
Firm-Destination Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Destination-Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	65,235	65,235	65,235	67,709	67,709	67,709
Timing of the Effects						
	OLS	First Stage - December	First Stage - Other Months	IV		
CA x December	0.128 (0.118)			0.124 (0.130)		
CA x Other Months	0.019*** (0.006)			0.383*** (0.142)		
EPA	0.059*** (0.021)	0.000 (0.000)	0.068 (0.086)	0.034 (0.039)		
Age	0.498*** (0.045)	0.001 (0.001)	0.184 (0.156)	0.450*** (0.069)		
Email x December		2.174*** (0.561)	-0.186 (0.138)			
Email x Other Months		-0.002 (0.002)	0.386*** (0.095)			
F-Statistics				8.12		
Firm-Destination Fixed Effect	Yes	Yes	Yes	Yes		
Destination-Year Fixed Effect	Yes	Yes	Yes	Yes		
Observations	77,414	77,414	77,414	77,414		

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

Columns 1-3 in the upper panel of the table report OLS and IV estimates of Equations (2) along with estimates of Equation (3) based on a placebo exercise whereby firms using *ConnectAmericas* in 2016 are assumed to have used it in 2013 and 2010-2013 is used as the sample period. Columns 4-6 in the same panel report the respective estimates as obtained in our baseline period, 2013-2016, when the sample is restricted to those firm-destination combinations that were also present in 2010-2013. Equation 2 (Columns 1, 3, 4, and 6): The dependent variable is the natural logarithm of export value at the firm-destination-year level. The explanatory variables are the number of days the firm visited *ConnectAmericas* website (CA); a binary indicator that takes the value of one if the firm was assisted by the trade promotion organization and zero otherwise (EPA); the natural logarithm of the firm's age (Age). Equation 3 (Columns 2 and 5): The dependent variable is the number of days the firm visited *ConnectAmericas* website (CA). The explanatory variables are a binary indicator that takes the value of one if the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise (Email); a binary indicator that takes the value of one if the firm was assisted by the trade promotion organization and zero otherwise (EPA); the natural logarithm of the firm's age (Age). The lower panel of the table reports OLS and IV estimates of a variant of Equation (4) along with estimates of the respective first stage. The sample period is 2013-2016. Equation 4 (Columns 3 and 6): The dependent variable is the natural logarithm of export value at the firm-destination-year level. The explanatory variables are the number of days the firm visited *ConnectAmericas* website interacted with a binary indicator that takes the value of one if the firm joined *ConnectAmericas* in December/Other Months and zero otherwise (CA x December/CA x Other Months); a binary indicator that takes the value of one if the firm was assisted by the trade promotion organization and zero otherwise (EPA); the natural logarithm of the firm's age (Age). First Stage Equation (Columns 4 and 5): The dependent variable is the number of days the firm visited *ConnectAmericas* website (CA). The explanatory variables are a binary indicator that takes the value of one if the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise interacted with a binary indicator that takes the value of one if the firm joined *ConnectAmericas* in December/Other Months and zero otherwise (Email x December/Email x Other Months); a binary indicator that takes the value of one if the firm was assisted by the trade promotion organization and zero otherwise (EPA); the natural logarithm of the firm's age (Age). Firm-destination fixed effects and destination-year fixed effects are included in all cases (not reported). Standard errors clustered by firm are reported in parentheses below the estimated coefficients. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 6

The Impact of *ConnectAmericas* on Firms' Exports

Mechanisms: Types of Information				
	OLS	Reduced-Form	First Stage	IV
CA	0.033*** (0.012)			0.534*** (0.191)
EPA	0.058*** (0.021)	0.060*** (0.021)	0.070 (0.060)	0.023 (0.037)
Age	0.499*** (0.045)	0.521*** (0.046)	0.117 (0.116)	0.459*** (0.071)
Email		0.148*** (0.042)	0.277*** (0.063)	
F-Statistics				19.64
	OLS	Reduced-Form	First Stage	IV
CA_Connect - CA_Learn	0.034*** (0.012)			0.545*** (0.195)
EPA	0.058*** (0.021)	0.060*** (0.021)	0.073 (0.058)	0.020 (0.037)
Age	0.498*** (0.045)	0.521*** (0.046)	0.121 (0.114)	0.455*** (0.071)
Email		0.148*** (0.042)	0.271*** (0.061)	
F-Statistics				19.84
Firm-Destination Fixed Effect	Yes	Yes	Yes	Yes
Destination-Year Effect	Yes	Yes	Yes	Yes
Observations	77,414	77,414	77,414	77,414

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

The table reports OLS and IV estimates of Equation (2) along with estimates of Equation (3) and those of the respective reduced-form equation. The sample period is 2013-2016. Equation 2 (Columns 1 and 5): The dependent variable is the natural logarithm of export value at the firm-destination-year level. The explanatory variables are the number of days the firm visited the *Connect* section of the *ConnectAmericas* website (*CA_Connect*); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Reduced-Form Equation (Column 2): The dependent variable is the natural logarithm of export value at the firm-destination-year level. The explanatory variables are a binary indicator that takes the value of one is the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise (*Email*); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Equation 3 (Column 3): The dependent variable is the number of days the firm visited the *Connect* section of the *ConnectAmericas* website (*CA*). The explanatory variables are a binary indicator that takes the value of one is the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise (*Email*); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). The lower panel of the table reports OLS and IV estimates of a modified version of Equation (2) along with estimates of Equation (3) and those of the respective reduced-form equation. The sample period is 2013-2016. Equation 2 (Columns 1 and 5): The dependent variable is the natural logarithm of export value at the firm-destination-year level. The explanatory variable are the difference in the number of days the firm visited the *Connect/Learn* sections of the *ConnectAmericas* website (*CA_Connect - CA_Learn*); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Reduced-Form Equation (Column 2): The dependent variable is the natural logarithm of export value at the firm-destination-year level. The explanatory variables are a binary indicator that takes the value of one is the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise; a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Equation 3 (Columns 4 and 5): The dependent variable is the number of days the firm visited *ConnectAmericas* website (*CA*). The explanatory variables are binary indicator that takes the value of one is the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise; a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Firm-destination fixed effects and destination-year fixed effects are included in all cases (not reported). Standard errors clustered by firm are reported in parentheses below the estimated coefficients. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 7

The Impact of <i>ConnectAmericas</i> on Firms' Exports				
Heterogenous Effects and Channels				
Firms' Presence in <i>ConnectAmericas</i> in the Destination				
	N=			
	4	8	10	
CA x Destination with more than N firms in <i>ConnectAmericas</i>	0.021*** (0.007)	0.023*** (0.008)	0.025*** (0.009)	
CA x Destination with up to N firms in <i>ConnectAmericas</i>	0.012** (0.006)	0.009 (0.006)	0.008 (0.005)	
Firm-Destination Fixed Effect	Yes	Yes	Yes	
Destination-Year Fixed Effect	Yes	Yes	Yes	
Observations	77,414	77,414	77,414	
Familiarity with the Destination and Firms' Export Experience				
	OECD	N-OECD	Experienced Firm	Inexperienced Firm
CA	0.026*** (0.008)	-0.002 (0.008)	0.015*** (0.005)	0.028* (0.016)
Firm-Destination Fixed Effect	Yes		Yes	
Destination-Year Fixed Effect	Yes		Yes	
Observations		77,414		77,414
Channels				
Export Value			0.019*** (0.006)	0.022*** (0.007)
Number of Products			0.007*** (0.002)	0.008*** (0.002)
Number of Buyers				0.009*** (0.002)
Export per Product and Buyer				0.006 (0.007)
Firm-Destination Fixed Effect			Yes	Yes
Destination-Year Fixed Effect			Yes	Yes
Observations			77,414	58,354

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

The first and second panels of the table reports OLS estimates of a variant of Equation (4). The sample period is 2013-2016. Equation 4 (Columns 3 and 6): The dependent variable is the natural logarithm of export value at the firm-destination-year level. First panel: The main explanatory variables are the number of days the firm visited *ConnectAmericas* website interacted with a binary indicator that takes the value of one if the number of firms registered in *ConnectAmericas* in the destination is above/up to 4, 8, or 10 and zero otherwise (Columns 2, 3, and 4, respectively). Second panel: The main explanatory variables are the number of days the firm visited *ConnectAmericas* website interacted with a binary indicator that takes the value of one if the destination is/is not an OECD member country and zero otherwise (Chile and Mexico are not included among these countries) (Columns 1 and 2); and the number of days the firm visited *ConnectAmericas* website interacted with a binary indicator that takes the value of one if the firm exported (experienced firm)/did not export (inexperienced firm) to the destination in question before 2013 and otherwise (Columns 3 and 4). The third panel reports OLS estimates of Equation (2). The sample period is 2013-2016. The dependent variable is the natural logarithm of export value, the natural logarithm of the number of exported products, the natural logarithm of the number of buyers, and the natural logarithm of the average export value per product and buyer, all at the firm-destination-year level. The explanatory variables are the number of days the firm visited *ConnectAmericas* website (CA). A binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*), the natural logarithm of the firm's age (*Age*), and firm-destination fixed effects and destination-year fixed effects are included in all cases (not reported). Standard errors clustered by firm are reported in parentheses below the estimated coefficients. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 8

The Impact of <i>ConnectAmericas</i> on Firms' Export Extensive Margin						
Baseline and Alternative Specifications						
OLS						
CA	0.0008*** (0.0003)	0.0008*** (0.0003)	0.0007*** (0.0003)	0.0008*** (0.0003)	0.0005* (0.0003)	0.0006** (0.0003)
EPA	0.0004 (0.0005)	0.0004 (0.0005)	0.0004 (0.0005)	0.0004 (0.0006)	0.0003 (0.0005)	0.0001 (0.0006)
Age	0.0003 (0.0008)	0.0003 (0.0008)	0.0003 (0.0008)	0.0004 (0.0008)	0.0003 (0.0007)	0.0002 (0.0007)
First Stage						
EPA	0.0273 (0.0685)	0.0272 (0.0685)	0.0104 (0.0721)	0.0162 (0.0773)	0.0370 (0.0683)	0.0506 (0.0789)
Age	-0.0524 (0.0442)	-0.0524 (0.0442)	-0.0293 (0.0388)	-0.0459 (0.0406)	-0.0255 (0.0425)	-0.0368 (0.0430)
Email	0.0935*** (0.0239)	0.0934*** (0.0238)	0.0753*** (0.0240)	0.0803*** (0.0271)	0.0690*** (0.0252)	0.0703** (0.0278)
IV						
CA	0.0130*** (0.0043)	0.0133*** (0.0044)	0.0136** (0.0055)	0.0133** (0.0055)	0.0157** (0.0070)	0.0164** (0.0077)
EPA	0.0000 (0.0010)	0.0000 (0.0010)	0.0003 (0.0011)	0.0002 (0.0011)	-0.0003 (0.0012)	-0.0007 (0.0014)
Age	0.0010 (0.0009)	0.0010 (0.0009)	0.0006 (0.0009)	0.0010 (0.0009)	0.0006 (0.0010)	0.0007 (0.0009)
F-Statistics	15.36	15.34	9.81	8.79	7.51	6.38
Firm-Destination Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	No	No	No	No	No
Destination-Year Fixed Effect	No	Yes	No	Yes	Yes	Yes
Department-Year Fixed Effect	No	No	Yes	No	No	No
2 Digit ISIC Sector-Year Fixed Effect	No	No	Yes	No	No	No
Department-2 Digit ISIC Sector-Year Fixed Effect	No	No	No	Yes	No	No
Province-Year Fixed Effect	No	No	No	No	Yes	No
4 Digit ISIC Sector-Year Fixed Effect	No	No	No	No	Yes	No
Province-4-Digit ISIC Sector-Year Fixed Effect	No	No	No	No	No	Yes
Observations	1,506,312	1,506,312	1,506,312	1,506,312	1,506,312	1,506,312

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

The table reports OLS and IV estimates of alternative specifications of Equation (5) along with estimates of Equation (3). The sample period is 2013-2016. Equation 5 (first and third panels): The dependent variable is a binary indicator that takes the value of one if the firm exported to the destination in question and zero otherwise. The explanatory variables are the number of days the firm visited *ConnectAmericas* website (*CA*); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Equation (second panel): The dependent variable is the number of days the firm visited *ConnectAmericas* website (*CA*). The explanatory variables are a binary indicator that takes the value of one is the firm received an email from the trade promotion organization announcing the launching of the platform and zero otherwise (*Email*); a binary indicator that takes the value of one is the firm was assisted by the trade promotion organization and zero otherwise (*EPA*); the natural logarithm of the firm's age (*Age*). Firm-destination fixed effects and year fixed effects are included in the first column; firm-destination fixed effects and destination-year fixed effects are included in the second column; firm-destination fixed effects, destination-year fixed effects, department-year fixed effects, 2- digit ISIC sector-year fixed effects are included in the third column; firm-destination fixed effects, destination-year fixed effects, department-2- digit ISIC sector-year fixed effects are included in the fourth column; firm-destination fixed effects, destination-year fixed effects, province-year fixed effects, 4- digit ISIC sector-year fixed effects are included in the fifth column; and firm-destination fixed effects, destination-year fixed effects, province-4- digit ISIC sector-year fixed effects are included in the sixth column (not reported). Standard errors clustered by firm are reported in parentheses below the estimated coefficients. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Figure 1
Number of Firms Registered by Country, 2016

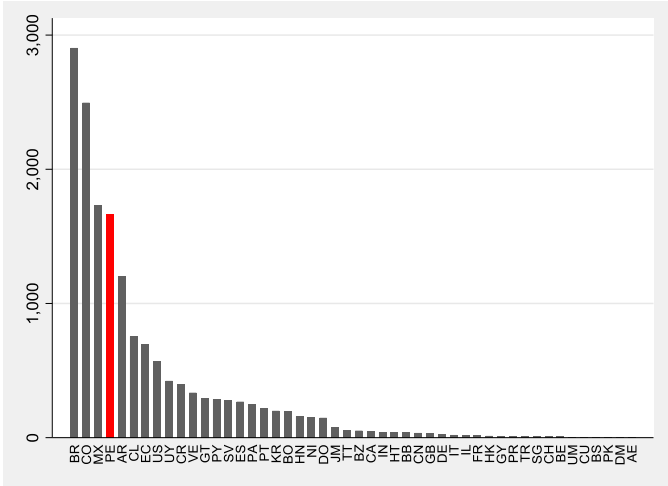
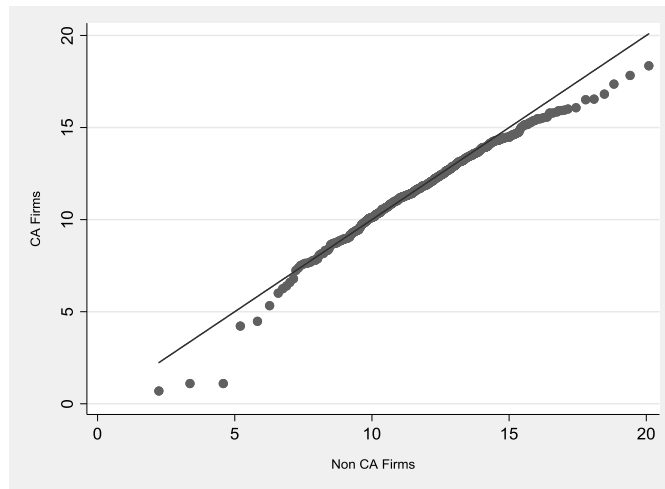


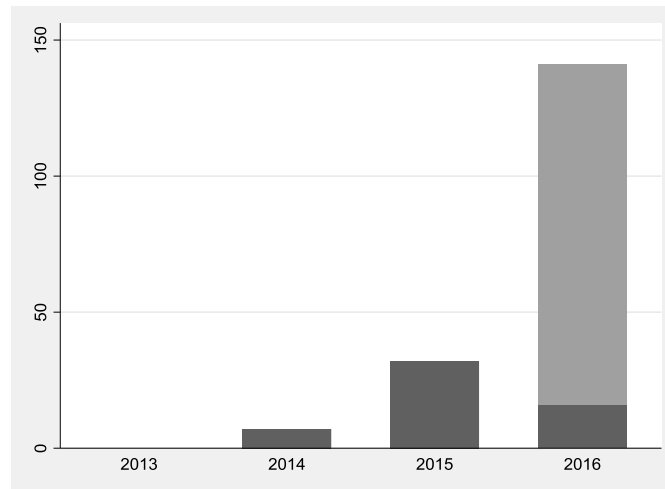
Figure 2
Distribution of firm-destination exports, ConnectAmericas Firms vs. Non-ConnectAmericas Firms, 2013



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

The figure shows the distribution of the natural logarithm of firm-destination exports for firms that joined *ConnectAmericas* in 2016 and for firms that never joined the platform, both in 2013.

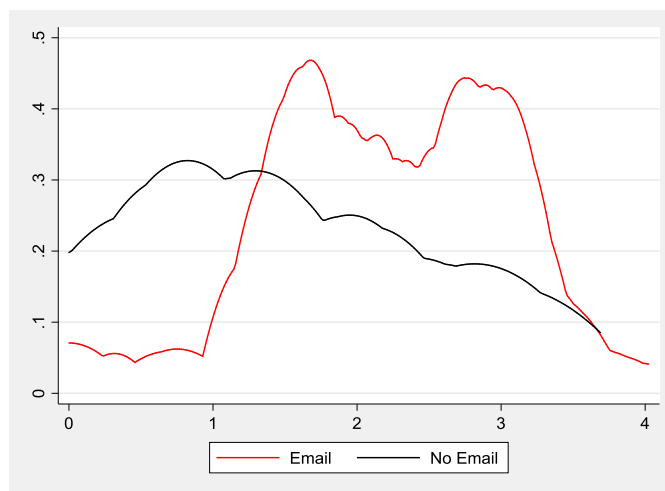
Figure 3
Number of Exporting Firms Registered in *ConnectAmericas*, 2013-2016



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

The figure shows the evolution of the number of Peruvian exporting firms registered in *ConnectAmericas* from 2013 to 2016. The light grey portion in the vertical bar for 2016 corresponds to the number of firms that received an email from PROMPERU announcing the launching of the platform.

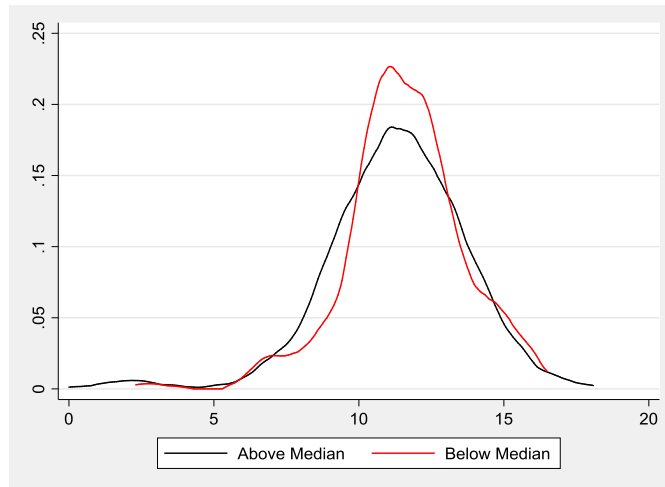
Figure 4
Intensity of Use of *ConnectAmericas*, Firms Receiving Email vs Firms Not Receiving Email, 2016



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

The figure shows the distribution of the natural logarithm of the number of days the firms visited *ConnectAmericas* for firms that received an email from PROMPERU announcing the launching of the platform and for firms that did not receive such an email.

Figure 5
Distribution of Exports According to the Intensity of Use of *ConnectAmericas*, 2015



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

The figure shows the distribution of the natural logarithm of firm-destination exports for firms whose number of days visiting *ConnectAmericas* in 2016 was up to the median and for firms whose number of days visiting *ConnectAmericas* in 2016 was above the median, both in 2015.

Appendix

Name Harmonization and Matching Methodology

Since *ConnectAmericas* does not request the tax ID when firms register in the website, we match this database with the customs database using the firms' names. Firms 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 dataset 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 dataset but not in the other or firms that appear with different business structures in each dataset.

Second, we use a fuzzy matching algorithm to compare the harmonized names across datasets.²⁵ 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 data. Of the total of 201 firm name matches we obtained for the period 2014-2016, 175 were a

²⁵We use a command called *matchit* written in STATA by Julio D. Raffo.

perfect match between standardized names and 26 were in a range of similarity of 85% to 99%.

The buyers' data comes at the exporter-product-destination-buyer-year level. Although the exporter is identified with a tax ID, the buyer is not. The data only specifies the buyer's name. If buyers' names were always spelled in the same way, we could just create an ID for each buyer. However, even the same the buyer, can be registered with different names across different combinations of exporter-product-destination. This could be due to business structure or to spelling. This is problematic because we are interested in the number of buyers an exporter sells to in a given destination country. Not correcting for spelling differences could lead to overstating the number of buyers a firm has. To avoid multiple accounting of the same buyer, we proceed in a similar way as in matching customs and *ConnectAmericas* data. First, we harmonize buyers' names using the same procedure as in the previous-sub-section. Second, within each destination country we compare all buyers' names using a Stata command called *strgroup*, with a threshold of 85%. As in the previous-sub-section, we then perform a clerical review to validate the 100% matches and to decide on the 85-99% matches.²⁶

*PROMPERU and its Trade Promotion Activities*²⁷

PROMPERU is Perú's national public export promotion organization and is headquartered in Lima.²⁸ Its highest governing body is the Board of Directors Directive Board, which is chaired by the minister of foreign trade and tourism and is composed of representatives from entities of the public and private sector, such as the Ministry of Foreign Relations, the Ministry of Economy and Finance, the Exporters Association and Perú's Society of Foreign Trade. In addition to the board, PROMPERU's organizational structure consists of a general secretary and two divisions, one for promoting exports and one for tourism.

As of 2015, the agency's budget was \$76.8 million. Annual resources available for the export promotion division are \$18.6 million as promoting tourism absorbs a large

²⁶ Another issue with this dataset is that several combinations of exporter-product-destination have the buyer listed as "NO DEFINIDO" (Undefined, in Spanish). discard all the observation with unidentified buyers, but these represent a very minor share of total trade.

²⁷ This section is based on van Biesebroeck et al. (2016).

²⁸ PROMPERU employees manage six regional offices within Peru which provide local companies with basic training and general information on the export process and foreign markets. In addition, it has regional information centers that are staffed and managed by employees of local governments or business associations, which provide information on marketing, prices of products with overseas demand, profiles of products with greater demand abroad, and export procedures and tax regimes; and organize training activities (Volpe Martincus, 2010).

fraction of the total budget. Most of the budget is provided directly by the government. PROMPERU had 380 employees of which 94 are with the export division. This division has units responsible for market intelligence, capacity building (export development), and trade promotion. Many employees have previous experience in foreign trade.

PROMPERU's main goal is to contribute to the internationalization of Peruvian firms by fostering their penetration of foreign markets and consolidating their positions in these markets. In pursuing this goal, the organization provides firms with multiple services. It trains inexperienced firms on the export process, marketing, and negotiations; performs and disseminates analyses on country and product market trends; provides specific information on trade opportunities abroad as well as specialized counseling and technical assistance on how to take advantage of these opportunities; coordinates and supports (and sometimes co-finances) firms' participation in international trade missions or fairs and, importantly, arranges meetings with potential foreign buyers; organizes these kind of trade events; and sponsors the creation of consortia of firms aiming to strengthen their competitive position in external markets.