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Abstract

How can policymakers promote women-led exporting firms? In this paper, we study the role of online business platforms to reduce informational barriers to exporting for women entrepreneurs. We hypothesize that, if the costs associated with accessing digital platforms are more symmetric across gender than traditional trade costs, digital trade platforms can play an important role in making trade more gender equal. To assess this hypothesis, we combine information on firms' participation in *ConnectAmericas*, a free and purely informational online platform, and detailed firm-level export data of a developing country over a long period. We find that participation in this platform is associated with a significantly larger increase in exports for women entrepreneurs than for men-managed firms in otherwise identical products and destinations. Given existing evidence on the role of women-managed businesses in reducing gender earnings inequality, these results suggest that policies which encourage women participation in online environments, to reduce the informational barriers associated with operating in foreign markets, have the capacity to promote gender equality more broadly.

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1. Introduction

Firms managed by men still dominate marketplaces worldwide, and women entrepreneurs have been shown to face disproportionate barriers to growth (Sabarwal and Terrell 2008).¹ Small, women-led businesses further encounter particularly large logistical barriers to foreign market access (Sekkel 2020). Virtually all countries around the world have trade promotion programs that aim to reduce the information frictions that firms encounter when attempting to enter and expand in foreign markets. The existing evidence consistently indicates that these programs are effective in lowering information costs and helping firms increase and diversify their exports (e.g., van Biesebroeck *et al.* 2016). Can such programs support and promote women-led exporting firms?

In this paper, we study the role of online business platforms to reduce informational barriers to exporting for women entrepreneurs. We hypothesize that, if the costs associated with accessing digital platforms are more symmetric across gender than traditional trade costs, digital trade platforms can play an important role in making trade more gender equal. To assess this hypothesis, we combine information on firms' participation in *ConnectAmericas*, a free and purely informational online platform, and detailed firm-level export data of a developing country over a long period. We find that participation in this platform is associated with a significantly larger increase in exports for women entrepreneurs than for men-managed firms in otherwise identical products and destinations. Given existing evidence on the role of women-managed businesses in reducing gender earnings inequality², these results suggest that policies which encourage women participation in online environments, to reduce the informational barriers associated with operating in foreign markets, have the capacity to promote gender equality more broadly.

Our work builds on and extends the findings in Carballo *et al.* (2022) that online business platforms enhance firms' export performance in the years after they register with the platform. We rely on detailed information from the Inter-American Development Bank (IDB) on the online business platform known as *ConnectAmericas*, designed for the purpose of guiding and supporting firm internationalization. With data on all participating firms, across a wide range of

¹ According to the World Bank's *Enterprise Surveys*, across all countries, only 17.9 percent of firms report a woman top manager.

² Godwyn and Stoddard (2017) report that women entrepreneurs contribute a larger share of earnings to the social good, including giving voice and opportunities to those in their communities (i.e., other women).

countries and sectors, as well as firms' self-reported gender of the management team, we first offer a descriptive analysis of women-led firms associated with the business platform. The descriptive figures provide informal support for the notion that the costs associated with accessing digital trade platforms tend to more gender equal, as we note disproportionate participation of women entrepreneurs in the platform.

With this background in mind, we further expand on the methodology in Carballo *et al.* (2022) to test whether access to the *ConnectAmericas* platform differentially benefits women exporters. To do so, we match the gender management information from *ConnectAmericas* to a database covering the universe of Peruvian exporters provided by the Peruvian customs and tax agency and national trade promotion organization. Our core estimation considers the impact of participation in the online business platform for men-led relative to women-led exporters on firm-specific export values and volumes within a product-destination pair. We include several layers of high-dimensional fixed effects to partially account for any potential self-selection into the platform and carry out event studies (before and after registration with the platform) alongside.

Our findings provide evidence that digital platforms can play an important role in making trade more gender equal. *ConnectAmericas* supports and promotes trade for women entrepreneurs by a significantly larger margin than for men-managed firms in otherwise identical products and destinations. In our most robust specification, participation in *ConnectAmericas* increases export values for women-led firms by almost 40 percent within product and destination, but increases export values for equivalent men-managed firms by only around 10 percent. Trade promotion agencies purposefully design programs and activities to take advantage of the opportunities created by digital technologies; our work demonstrates that these programs can work simultaneously to promote women exporters.

The rest of this paper is organized as follows. In section 2, we cover the broad economic literature related to our work, with special attention to the implications of information and communications technologies (ICT) on the specific barriers faced by women entrepreneurs and women exporters. Section 3 describes the main data sources we utilize to investigate our core questions, offering some simple descriptive statistics alongside. Section 4 provides a background analysis on the relevance of online platforms for women drawing from our previous work in Fernández-Ortiz *et al.* (2022). Section 5 presents descriptive evidence for Peru, lays out our empirical strategy focused on such a case study to assess the impact of online business platforms

specifically for women exporters. and reports and discusses the main estimation results. We conclude in the final section with implications for policy.

2. Background Literature

The exchange of goods and services, the flow of financial capital, the migration of peoples, and the daily transactions of terabytes of data increasingly link countries in the global economy. Many policymakers and academics alike agree that reforms in the latter half of the 20th century, such as liberalizing trade relations, were powerful drivers of efficiency gains, income growth, and consumer choice around the globe. However, despite these lower policy barriers to international trade, substantial informational barriers to access to foreign markets still exist, limiting the potential gains to cross-border trade relations.

Business networks have been shown to reduce the search frictions associated with such informal border barriers to trade. For example, networks may help to provide efficient matches between buyers and sellers, transfer information about the local culture, customs, and consumer markets, and provide informal contract enforcement (Rauch 1999). As such, tools that help networks communicate have been shown to be powerful sources of bilateral trade flows: telephone traffic (Portes and Rey 2005), the internet (Freund and Weinhold 2004), and international travel flows (Cristea 2011 and Poole 2016).

Specifically for women, the establishment of close business networks helps firms to innovate and improve, ultimately benefitting the performance of women-owned firms (del Mar Fuentes-Fuentes *et al.* 2017). Moreover, being in close proximity to other firms owned by women has been shown to benefit women-led firm productivity (Marques 2015), suggesting business networks function both within industries and among women businesses. These ideas reinforce the importance of business networks and the role of communications technologies in helping businesses grow, particularly so for women entrepreneurs, which may face greater informal barriers.

In this research, we are interested in the relationship between a specific kind of business network, in the form of an online business platform, in reducing frictions that prevent or limit trade partnerships for women-managed businesses. In this sense, our research is related to several different literatures. We begin with a review of the existing evidence on the barriers faced by

women-led companies, and the role of digital technologies to overcome these barriers. We then turn to a discussion of the association between online business platforms and international trade, regardless of the management's gender. We finish with a short outline of the very few other papers to recognize the role of digitalization and e-commerce to facilitate trade for women.

2.1. *Digital Technologies and Women Entrepreneurship*

Barriers to women-run businesses. According to McClelland *et al.*'s (2005) small sample study of 56 women entrepreneurs across 6 countries, many women start firms that are “socially oriented” and base their businesses around hobbies. In this respect, women entrepreneurs face unique challenges, such as underrepresentation, due to factors such as cultural norms and stereotypes, a lower propensity for risk as compared to men entrepreneurs (Ughetto *et al.* 2020), and a greater need for a flexible work schedule to accommodate home life (McClelland *et al.* 2005). In international markets, women report encountering disproportionate logistical obstacles in foreign markets according to Sekkel (2020). Davies and Mazhijeyev (2021) focus on factors that impact export propensity among women-owned and men-owned firms and report a significant relationship between firm size and gender on the export status of small and medium enterprises.³ This supports the notion that women-owned firms face higher barriers to growth and may be an important reason why women-run firms are smaller (on average) than their men counterparts (Sabarwal and Terrell 2008). Robb and Watson (2010) report that in years 2 and 3 of a business, women-owned firms were more likely to close, but once a business was open for 4 or more years, the likelihood of survival is equal to that of men-owned firms.

The role of ICT technologies. Digital technologies play an important role in shaping the business environment for all firms. Growth of firms in the modern time hinges on access and effective implementation of ICT technologies (Isa *et al.* 2021). This implementation of ICT technologies has spurred greater cross-border trade, particularly in the context of regional trade agreements that lower tariffs and other traditional trade barriers, thereby fostering business development, especially for micro, small, and medium enterprises (Bacamas *et al.* 2022).

³ This is also true in our data (see Table A1 in the appendix). Among *ConnectAmericas* firms, just under 11 percent of women-managed firms are large, while almost a quarter of men-led firms report greater than 100 employees. In other words, women-run firms are disproportionately represented among smaller firms (48 percent), and less likely to be represented among larger firms (29 percent).

Many scholars have studied the effects of gender on business performance when integrating ICT technologies into their business. The expansion of ICT technologies in business has reduced many of the barriers associated with women-led business growth, particularly in sectors and industries in which women are more likely to be represented (Sekkel 2020). ICT technologies reduce the cost of trade in goods, including through the provision of training and access to more and better information, open opportunities specifically to trade in services, and enhance access to necessary financing to run a business (Sicat *et al.* 2020). In these ways, digital technologies help women to “even the playing field,” according to Pergelova *et al.* (2019). Moreover, digital technologies are a key mechanism to help reduce hurdles faced by women including mobility constraints, discrimination, and sometimes violence (Sicat *et al.* 2020).⁴

2.2. Do Online Platforms Facilitate Trade (for Women)?

Lendle and Vézina (2015) and Lendle *et al.* (2016) investigate the role of e-commerce platforms in facilitating trade. The authors argue that such online platforms have provided an excellent way for firms to grow and connect with global trade and have significantly reduced the impact of distance on trade. Cong *et al.* (2022) note the role of digital marketplaces and e-commerce platforms enable work flexibility for women entrepreneurs allowing for the expansion of distributional channels.

As digital e-commerce technologies gain relevance in global markets, Carballo *et al.* (2022) note the importance of online platforms, like Amazon, Alibaba, and eBay, in reducing informational frictions and search costs associated with exporting. Relying on a unique dataset that combines information on detailed firm-level exports from the Peruvian customs and firm participation in an online business platform, the authors report that participation in the free online business platform known as *ConnectAmericas* increases export values by 17 percent on average across exporters. The authors further note that, as the business platform is non-

⁴ From a sociological perspective, women entrepreneurs in developing countries, have experienced a sense of “mattering” or a sense of having others depend on that business and therefore that woman entrepreneur (Chew *et al.* 2013). This finding is supported by Chew *et al.* (2010) in which ICT access helped grow businesses owned by women and as a result gives women more positive feelings towards her business. This in turn can support women to seek to grow their business and look to maintain the business and serve as a motivation for maintaining the business well into the future. The sense of empowerment that women experience by adopting ICT technologies and e-commerce platforms into their business plans can serve to promote more women entrepreneurs and ownership in businesses, thus benefitting not only the women, but the community in which they are active members.

transactional, the increased export flows are not the result of facilitated transactions, since the platform does neither enable transactions through a payment mechanism nor provides logistic solutions, but rather due to a reduction in informational barriers to trade.

In follow-on work, which we replicate in Section 4 for women-led firms, Fernández-Ortiz *et al.* (2022) note the strong presence of women-owned firms in the online business platform. The share of women-owned firms increased from 30 percent in 2014, when the platform was launched, to nearly 45 percent in the most recent complete year. This is far larger than the overall women ownership shares across countries; that is, the prevalence of women-owned firms in the digital platform is consistently broader than the share of companies owned by women in each country's economy as a whole (based on comparable statistics from the World Bank *Enterprise Surveys*). Given the outsized participation of women-owned businesses on the platform, it is likely that the women entrepreneurs view the access as valuable. It is exactly this question that we investigate in this research.

Orser *et al.* (2010) remark that investments in research and development, through the implementation of e-commerce for women entrepreneurs, are integral for export growth among women firms. Such e-commerce platforms and ICT technologies have also been shown to provide women entrepreneurs greater flexibility, who often have to account for children and other needs outside of their work (Jome *et al.* 2006).

3. Data

We combine two main data sources to carry out our empirical exercises on the relationship between online business platforms and international trade for women. First, we rely on information from *ConnectAmericas*, an online business platform managed by the IDB, for all firms in all countries participating in the platform to offer a descriptive analysis of women-led exporters. Second, we match the data from *ConnectAmericas* to the universe of export transactions from Peruvian customs for a case study relating participation in the online business platform to export values and volumes in that country.

3.1. *ConnectAmericas*

ConnectAmericas.com is a business media platform, developed by the IDB, Google, DHL, SeaLand (Maersk), MasterCard, and Facebook with the purpose of facilitating the internationalization of firms. Please see the Appendix and Carballo *et al.* (2022) for more details on the purpose and scope of *ConnectAmericas*.

Launched in 2014, firms easily register for free through the website. This point is particularly important – access to the website is free for any firm that wishes to register. In order to do so, they create a profile which includes a brief description of the company with contact information and several other relevant pieces of data. The firm self-reports on the year of establishment, country of operation, sector of activity and main products lines, whether they have a commercial presence in other countries, the number of workers they employ, and affiliations with business associations. Firms are also able to upload relevant promotional materials about their businesses and products.

Most importantly, for the research we conduct in this paper, the firm reports on the gender composition of the management team. To be precise, women-led firms are those that have a woman main manager (director or president). This information, available since the initial year of 2014, allows us to characterize the evolution and patterns of a firm’s participation in *ConnectAmericas* by gender.⁵ In some of the descriptive statistics we perform, we supplement the *ConnectAmericas* database with information from the World Bank’s *Enterprise Surveys* as a comparison to the economic situation in the relevant countries.

3.2. *Firm-Level Export Transactions and Characteristics for Peru*

For the Peruvian case study, we use an export transaction-level database provided by Peru’s tax and customs agency (SUNAT) and the national trade promotion organization, PROMPERU. Each record in this database includes the firm’s tax ID and name, the 10-digit Harmonized System (HS) product code, the destination country, the export value denoted in U.S. dollars, and the weight of the export in kilograms, with which we can proxy export quantities. In our empirical

⁵ Less than a third of firms in *ConnectAmericas* do not report the management of the firm by gender. For our analysis, we drop these firms from the exercises.

analyses, we aggregate the export transactions to the 6-digit HS product level for ease of interpretation.⁶ It is worth noting that, we restrict the sample of firms to only those with a positive export value in a given year.⁷

SUNAT and PROMPERU have also kindly provided us with other databases with relevant characteristics on the firm, such as location within the country (state and province), the sector of activity at the 4-digit ISIC (International Standard Industrial Classification) level, the year the firm was established, the number of employees, and trade promotion support from PROMPERU. These databases are easily merged, as they share the same firm identifiers. We use these variables as controls in the estimations that follow.

As *ConnectAmericas* does not contain any common firm-level tax identifiers, combining the firm-level Peruvian export data to *ConnectAmericas* requires an additional labor-intensive step. Carballo *et al.* (2022) use standard record-matching techniques to match the names in *ConnectAmericas* with the names in the Peruvian export transactions to create the final dataset for the regression analysis.

4. *ConnectAmericas* and Women-Led Firms

Recent evidence suggests that women and men are affected differently by trade and, significantly, by trade barriers and the policies addressing them (e.g., Benguria and Ederington (2023), Bøler *et al.* (2018), WTO (2020), and Korinek *et al.* (2021)). Given the fast growth of the digital economy, in general, and e-commerce, in particular, this leads to the question of whether and how digital platforms can modify trade participation in favor of women. In this section, we provide the first insights into this issue by examining the evolution and patterns of firm management by gender using the *ConnectAmericas* online business platform, designed to help enterprises access international markets. The analysis reveals that the platform has been associated with higher women participation: the share of women-led firms increased from

⁶ As is common in such customs databases, the data report goods transactions and do not reflect tradable services.

⁷ In the estimations that follow, our main outcome variable is the firm-level value of exports in a product-destination pair (and, thus, more commonly associated with an intensive margins of exports). However, we note that some of the increase in a firm's exports within destination-products may be the result of existing exporters finding new buyers – a form of an extensive margin that is not directly observed at the data's level of aggregation (see, for example, Bernard *et al.* (2018) and Carballo *et al.* (2018)).

around 35 percent in 2014, when *ConnectAmericas* was launched, to nearly 50 percent in 2021.⁸ In addition, these businesses are more prevalent than expected based on the overall share of women-managed firms in the respective countries and sectors in Latin America and the Caribbean, based on complementary data sources.

4.1. *Descriptive Background on ConnectAmericas*

Since *ConnectAmericas* launched at the beginning of 2014, as shown in Figure 1, the number of registered firms increased on average 83 percent per year to top 140,000 in 2021, from a total of 175 countries around the globe. We count a country as participating in the *ConnectAmericas* platform if the country has at least one firm participating that also lists the home base as that country. The number of unique users over the 8-year period reached over 470,000 firms.

Companies from countries around the world can join *ConnectAmericas*. However, given that it was purposefully created to favor the internationalization of companies based in Latin America and the Caribbean, these countries account for the largest numbers of firms: Colombia, Brazil, Mexico, Peru, and Argentina, as depicted in the left panel of Figure 2.

Services, food and beverages, and textiles, jewelry, and accessories are the sectors in which most *ConnectAmericas* companies operate (see the right panel of Figure 2). This holds true even relative to their size as proxied by the total number of employees or firms, as identified by the International Labor Organization and World Bank *Enterprise Surveys*, respectively. Examples of specific services companies offer are accounting, legal, insurance, and distribution. Food and beverage products consist, for instance, of legumes, vegetables, fruits, and liquors and spirits, whereas textiles, jewelry, and accessories include fabric (cotton, silk, linen), jeans, jackets, gloves, necklaces, eyewear, and belts.

⁸ This section is based on work in Fernández-Ortiz *et al.* (2022), with one main difference. In that work, the authors considered women-owned firms in *ConnectAmericas*. In this replication, for consistency with our empirical analysis below, we instead consider women-managed firms – those reporting a woman director or president. We note, however, that the core ideas remain the same.

4.2. Women-Led Firms in *ConnectAmericas*

In absolute terms, the share of *ConnectAmericas* firms managed by women went from around 35 percent in 2014 to almost 50 percent in 2021, as depicted in the left panel of Figure 3. Needless to say, however, different countries and sectors are associated with different levels of gender equality. Therefore, in the right panel of Figure 3, we illustrate coefficient estimates from a regression of an indicator of the firm’s management by gender on country-by-sector fixed effects, to account for the asymmetric distribution of firms across countries and sectors, as well as year fixed effects. The diamonds correspond to the point estimates on each year dummy and the bars illustrate confidence intervals for 90, 95, and 99 percent. We see that, even after accounting for across country and sector differences, the presence of women-managed companies in *ConnectAmericas* increased by almost 20 percentage points over the aforementioned period.⁹

In 2021, the share of *ConnectAmericas* firms that women managed ranged from just under 40 percent in Argentina to almost 80 percent in Trinidad and Tobago, among the Latin American and Caribbean nations (see Figure 4). These shares are systematically larger than the overall women management shares across countries. Figure 5 illustrates that the share of women-managed firms in the digital platform is consistently larger than the share of companies managed by women in each country’s economy as a whole, as captured by data in the World Bank’s *Enterprise Surveys*.¹⁰

Arguably, these differences in the relative importance of women-managed firms across countries could potentially reflect differences in their sectoral structures. This, however, does not seem to be the case. Figure 6 shows that, for select countries in Latin America with the largest numbers of firms, the share of businesses whose management includes women in *ConnectAmericas* is larger than the share of companies with women managers as identified in the *Enterprise Surveys*, even in the same countries and the same sectors.¹¹

⁹ These strong trends may at least partially be related to the dedicated initiatives *ConnectAmericas* designed and implemented to promote the participation of firms owned and managed by women, including “Women in Business” and, more recently, “Growing Together in the Americas”.

¹⁰ Our use of the log share of firms in Figure 5 is solely for visualization purposes to smooth the graphical illustration. We confirm the core idea that across countries around the world the share of women-managed firms in *ConnectAmericas* is consistently larger than the share of women-managed firms in the economy as a whole, as represented by the World Bank’s *Enterprise Surveys*, in similar graphics without the log transformation. In addition, a simple scatter plot across countries also confirms the notion.

¹¹ Hardy *et al.* (2023) note that the World Bank’s *Enterprise Surveys* often exclude hard-to-reach and informal businesses. The main statement of higher representation of women-led firms in *ConnectAmericas* holds when we replicate Figure 5

5. *ConnectAmericas* and Women-Led Exporters: A Case Study on Peru

Given the outsized participation of women-led businesses on the *ConnectAmericas* platform, it is likely that women entrepreneurs view the access as valuable. Perhaps the barriers to international commerce for women exporters are mitigated by digital technologies and e-commerce platforms. Certainly, the descriptive evidence in the previous section suggests that the costs of accessing digital trade platforms appear to be more symmetrically distributed across gender than traditional direct trade costs, such as tariffs. By significantly favoring the participation of women-led firms in a trade platform that reduces information and search costs, *ConnectAmericas* could have the potential to contribute to increased export possibilities for women-managed firms both across countries and sectors.

In order to investigate this idea more precisely, we extend the work in Carballo *et al.* (2022) to ask whether online platforms differentially improve export performance for women-managed firms in a case study on Peru. Given the barriers faced by women entrepreneurs we discuss in section 2, it is possible that the anonymity of and the more flexible time arrangements allowed for by the online platform relatively benefit women, as compared to more traditional means of reducing informational search and matching frictions, which require face-to-face communication, such as trade fairs and missions.

5.1. *ConnectAmericas* in Peru: Descriptive Evidence

Table 1 reports simple descriptive statistics about the gender composition of firms participating in the *ConnectAmericas* database once matched to the Peruvian export transactions for the entire sample period. More precisely, we report the total number of Peruvian firms in *ConnectAmericas* in column (3). Then, in columns (4) and (5), we describe the number and share, respectively, of those Peruvian firms in *ConnectAmericas* that are exporters. Finally, in columns (6) and (7), we state the number and share, respectively, of those Peruvian exporting firms in *ConnectAmericas* that are managed by women. In 2014, when *ConnectAmericas* was first launched, there were 22 Peruvian firms on the platform. Of these 22 firms, only 1 firm (4.5 percent of firms)

for exporting firms only, under the assumption that exporters are larger, easier-to-locate firms less likely to be informal. In this sense, the data from the *Enterprise Surveys* and from *ConnectAmericas* are more comparable.

was an exporter and this firm was managed by a woman. By the end of 2018, approximately 10 percent of the 4,697 Peruvian firms participating in *ConnectAmericas* were exporters, roughly half of which (225) were managed by women.

5.2. Empirical Strategy

With data linking the universe of Peruvian exporters to the *ConnectAmericas* database, which includes information on the entrepreneur’s self-identified gender, we first estimate the following regression, replicating the work in Carballo *et al.* (2022) for the subset of firms with information on the manager’s gender, relating access to the online platform with firm-level exports, by product and destination:

$$\ln X_{fpdst} = \gamma CA_{fst} + \varphi_{fpd} + \theta_{ft} + \delta_{pdst} + \varepsilon_{fpdst} \quad (1)$$

where the outcome of interest is the log of exports for firm f , product p , destination-country d , in semester s and year t . Following Carballo *et al.* (2022), we estimate equation (1) for three alternative dependent variables: the value (price times quantity) of exports, the quantity (weight) of exports, and the unit value (value divided by quantity) of exports.

In equation (1), CA_{fst} is a binary indicator that takes the value of one if firm f is registered in *ConnectAmericas* in semester s of year t and zero otherwise.¹² We expect $\gamma > 0$ as *ConnectAmericas* acts as a business network facilitating the communication of prospective buyers and suppliers, thus encouraging international trade.

The specification also includes several high-dimensional fixed effects to partially address concerns about firm self-selection into the platform. Importantly, we include firm-product-destination, firm-year, and product-destination-semester-year fixed effects. The firm-product-destination fixed effects aim to control for potential productivity differences across firms within a given product and destination, but also capture the general effects of management gender in promoting exports in a given product and destination. The firm-by-year dummies account for firm-specific shocks to productivity which may simultaneously induce participation in the

¹² Since firms are signing up to *ConnectAmericas* at different times, the estimation may suffer from some of the issues in such staggered difference-in-differences specifications, as noted in Callaway and Sant’Anna (2021). Our goal in this paper, however, is to replicate and build upon Carballo *et al.* (2022) to demonstrate the benefits of the digital platform for exporting and to extend that work to examine the potential for differential benefits for women exporters. Therefore, a complete examination of this issue is beyond the scope of the current paper but deserves an exploration in future research.

platform and enhanced export engagement, in addition to any other time-varying, firm-level controls we would want to include (but may not have available data). The product-destination-semester-year effects allow us to control for demand shocks for specific products in destination markets which may benefit all exporting firms.

Our main innovation in this paper is to extend the estimation in equation (1) by interacting the firm’s participation in *ConnectAmericas* with information on the gender of the firm’s manager, as follows:

$$\ln X_{fpdst} = \gamma CA_{fst} \times 1(W_f) + \lambda CA_{fst} \times 1(M_f) + \varphi_{fpd} + \theta_{ft} + \delta_{pdst} + \varepsilon_{fpdst} \quad (2)$$

All variables are as previously described, while W_f is an indicator variable equal to one if firm f is managed by a woman and M_f is an indicator variable equal to one if firm f is managed by a man. In this sense, we now test whether the digital business platform offers different benefits for women-led businesses and men-led businesses. Based on our conceptual framework, our hypothesis of a $\gamma > 0$ remains. In addition, based on the literature reviewed in Section 2 and the descriptive evidence presented in Section 4, we now further hypothesize that $\gamma > \lambda$, as the online business platform is likely to promote trade for women entrepreneurs even more so than for otherwise identical men-managed firms participating in *ConnectAmericas* and exporting similar products to similar destinations.

5.3. Estimation Results

In Table 2, we replicate the results in Carballo *et al.* (2022), reporting the coefficient estimates from the ordinary least squares regression of equation (1) with varying levels of fixed effects to account for the potential self-selection into the *ConnectAmericas* online business platform. In column (1), we include the firm-product-destination fixed effects – the dimension of our panel – in addition to broad region (province)-sector-year and product-destination-semester-year fixed effects. Column (1) also includes several time-varying, firm-specific covariates as controls, such as age, number of employees, and an indicator variable for trade promotion assistance. In column (2), we also add firm-specific time trends to attempt to account for systematic firm-specific productivity increases which may simultaneously induce participation in the platform and enhanced export engagement. Finally, our preferred and most robust specification in column (3) replaces the firm-specific time trends, firm-specific time-varying controls, and broad region-

sector-year dummies with the full spectrum of firm-by-year fixed effects to control for any firm-specific shocks to exporting.

In parallel with the results in Carballo *et al.* (2022), but for the slightly different sample of exporting firms including those in *ConnectAmericas* with complete information on the gender of the manager and those that are not registered with the platform, we find a consistent message. Participation in *ConnectAmericas* is associated with increased export values. The magnitudes are economically important—registering with the platform increases a firm’s exports by around 21 percent in a given product and destination. Like in Carballo *et al.* (2022), these increases are wholly attributable to larger export quantities, rather than higher unit values.

In Figure 7, we replicate the event study in Carballo *et al.* (2022) to assess whether voluntary participation in the online business platform was correlated with previous export outcomes. For example, if high productivity exporters are also the first firms to join *ConnectAmericas*, we would observe that firms participating in *ConnectAmericas* also report higher export values and volumes even prior to entering the platform. In the event study, we follow firm-level export flows within a product-destination pair for several periods before accession to the platform and several periods after accession to the platform. In Figure 7, year zero is the year a firm registers with the platform, while B denotes semesters before registration and A denotes semesters after the first registration. It is clear from the figure that the estimated coefficients are insignificant before the firm joins the platform at event time zero (that is, there is no statistical difference in exports between future *ConnectAmericas* firms and firms that do not register for the platform in the future). Notably, however, the estimates are statistically significant and positive for extended periods after the firm joins the platform.¹³ Together, these results confirm the findings in Carballo *et al.* (2022) and point to the benefit of the online platform in reducing the search and matching frictions associated with international exchange.¹⁴

In Table 3, we report estimates from the ordinary least squares regression of our main equation (2), with several different sets of fixed effects. Once again, we only utilize data for exporting firms in *ConnectAmericas* which have self-identified the gender of the management

¹³ It is worth mentioning that, for consistency with Carballo *et al.* (2022), the event study is based on a modified version of the two-way fixed effects estimator (i.e., they have not been obtained using new estimators such as those proposed by Sun and Abraham (2021) or Borusyak *et al.* (2023)).

¹⁴ Carballo *et al.* (2022) further investigate the potential mechanism using information on visits to the firms’ *ConnectAmericas* profiles. The results in that paper indicate that firms whose profiles were visited experience the largest export gains (even if the Peruvian exporters did not utilize the platform), suggesting that foreign (non-Peruvian) importers rely on the platform to search for suppliers.

along with those that have not joined it. Our core hypotheses are confirmed – the online business platform supports and promotes trade for women entrepreneurs by a significantly larger margin than for men-managed firms in otherwise identical products and destinations.¹⁵ In each panel, we also report the difference in the coefficients ($\gamma - \lambda$) and the associated *p-value* on the difference. In our most robust specification, participation in *ConnectAmericas* increases export values for women-led firms by almost 40 percent within product-destinations but increases export values for equivalent men-managed firms by only around (a more noisily-estimated) 10 percent.

Once again, perhaps women-managed firms had stronger exports even prior to joining the business platform. In order to assess this, we replicate the event study in Carballo *et al.* (2022) across women-led and men-led Peruvian exporters. The event study in Figure 8 confirms the results in Table 3. Women-led and men-led firms are statistically-indistinguishable in the pre-participation periods. After firms register for *ConnectAmericas*, women-led firms report an immediate positive response in export values, which increase over time since first participation. By contrast, it takes a few semesters for men-managed firms to reap the benefits of participation. We argue the more symmetric (low) costs for men and women are facilitating these differential gains, and that the lower (and not instantaneous) benefits for men may be due to the fact that men already access such benefits through other channels.¹⁶

We find qualitatively similar results for the quantity (weight) of exports, though (as expected) the point estimates are slightly different. With participation in the online platform, women-led firms report a 32 percent increase in export quantities, while otherwise identical firms selling the same products in similar destinations that are managed by men experience a smaller 14 percent increase in export weights. These estimates are, however, not statistically different from one another.

¹⁵ We acknowledge that the number of women-led firms has increased over time, which might give rise to general equilibrium effects. Having said that, we note that the direct effects of the increasing number or share of women-led firms across regions, sectors, products, and destinations are accounted for by the region-sector-year fixed effects and product-destination-year fixed effects in our estimations. Moreover, presumably with more women-managed firms, the impact of the business platform could be reduced over time, pushing any estimates toward zero; therefore, the fact that we still find a positive and significant effect is reassuring.

¹⁶ In Table A2 in the appendix, we report results from another version of our main estimating equation (2), in which we interact the main variables of interest (the interactions between *ConnectAmericas* membership and the dummy variables for women-led firms and men-led firms) with two binary indicators: a dummy variable for industries above the median value of the share of women-managed firms and a dummy variable for industries below the median value of the share of women-managed firms, in order to test whether the baseline effect is systematically related to industries with particularly high or low representation of women businesses. The results confirm the core ideas of the paper – access to the digital platform encourages exports for women entrepreneurs, and this result holds both in industries with strong representations of women businesses and industries that tend to be dominated by men.

However, we find that joining the platform is associated with increased products' unit values for women-led firms. The unit values of a given product sold in a specific destination increases by 7 percent after a women-led firm enters the platform. There is no equivalent result for men-led firms. One possible hypothesis is that women entrepreneurs face considerable discrimination in a typically men-dominated marketplace; however, behind the anonymity of the digitalized e-commerce platform, the quality of the products stand out, allowing women to charge relatively higher prices.¹⁷

6. Concluding Statements

How can policymakers promote women-owned exporting firms? Our research provides evidence that digital platforms can play an important role in making trade more gender equal. Trade promotion agencies purposefully design programs and activities to reduce information frictions, including through taking advantage of the opportunities created by digital technologies. Our work carefully demonstrates that these trade promotion programs can work similarly to promote women entrepreneurs. In this line, several Latin American countries have already launched dedicated digital business platforms with assistance from the IDB and *ConnectAmericas*, including Colombia (*Compra lo nuestro*), Panama (*PROPANAMA Conecta*), Mexico (*ComerciaMX*), and Paraguay (*Paraguay Export*). These platforms can also help countries gather detailed data disaggregated by gender – thereby complementing the more general efforts that are needed in this regard – and have a more agile communication with women entrepreneurs to identify promptly the specific barriers they face. These data are crucial inputs to produce comprehensive and accurate diagnoses of the trade barriers women face, conduct research on relevant gender and trade issues, and perform impact evaluations of women-focused trade programs, all of which are required to make evidence-based decisions and thus design and implement more effective policies in this area.

Policy itself also has an important role in shaping the business environment to alleviate some of the hurdles women entrepreneurs face. Digital technologies give women access to trainings, financing, and other programs that may not have been previously accessible. Equal access to

¹⁷ Identifying the mechanisms through which the observed effects arise is beyond the scope of this paper but is an important avenue for future research.

digital technologies and the internet can therefore help to close the gender gap between men and women. However, even with policies to promote digitalization among women-managed firms, women still face many additional difficulties in running businesses that men do not have to face. Finding ways to address these barriers can allow women to put themselves on equal footing to men, achieve greater economic activity and productivity, and ultimately serve to benefit the wider economy.

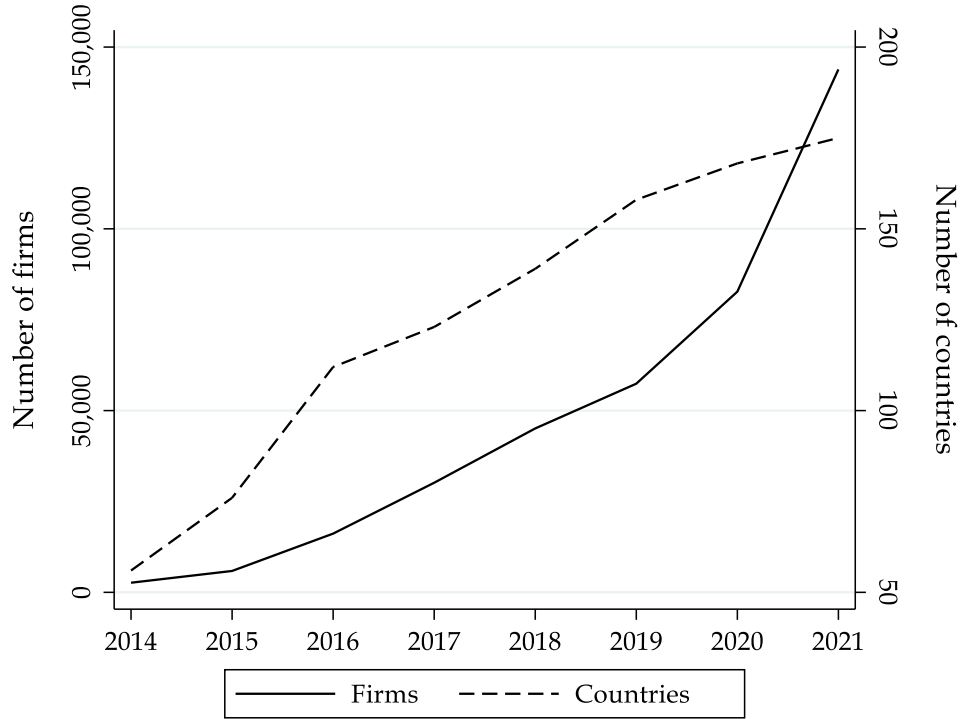
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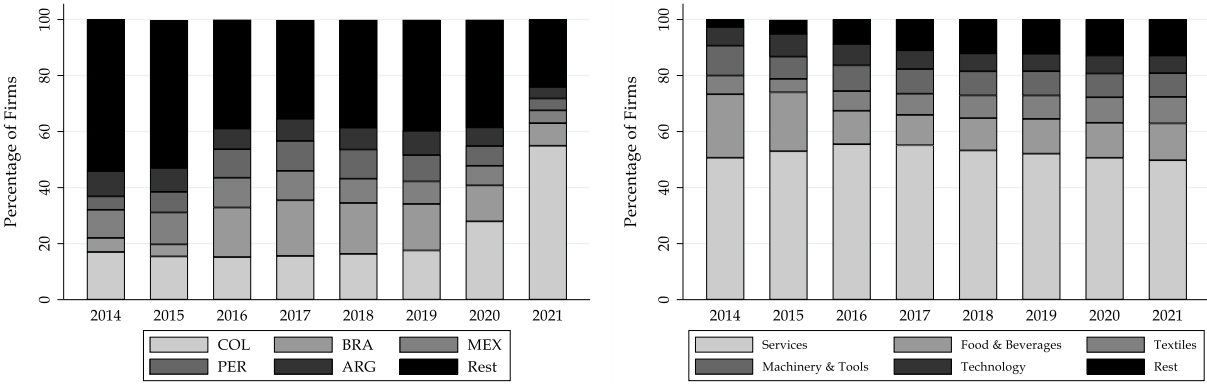
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Figure 1
Total Number of Firms and Total Number of Countries
ConnectAmericas, 2014-2021



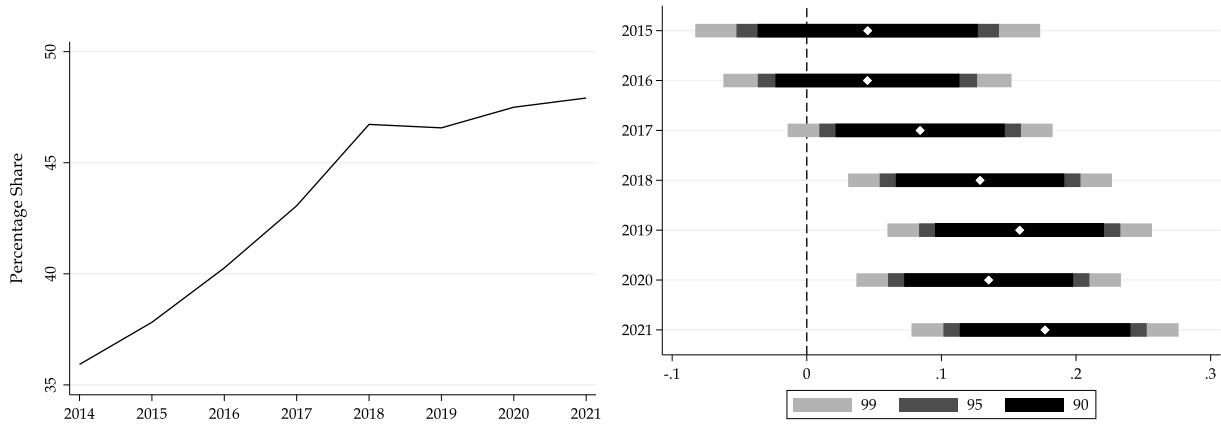
Source: Authors' calculations based on data from *ConnectAmericas*.

Figure 2
Total Number of Firms, by Country and Sector
ConnectAmericas, 2014-2021



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

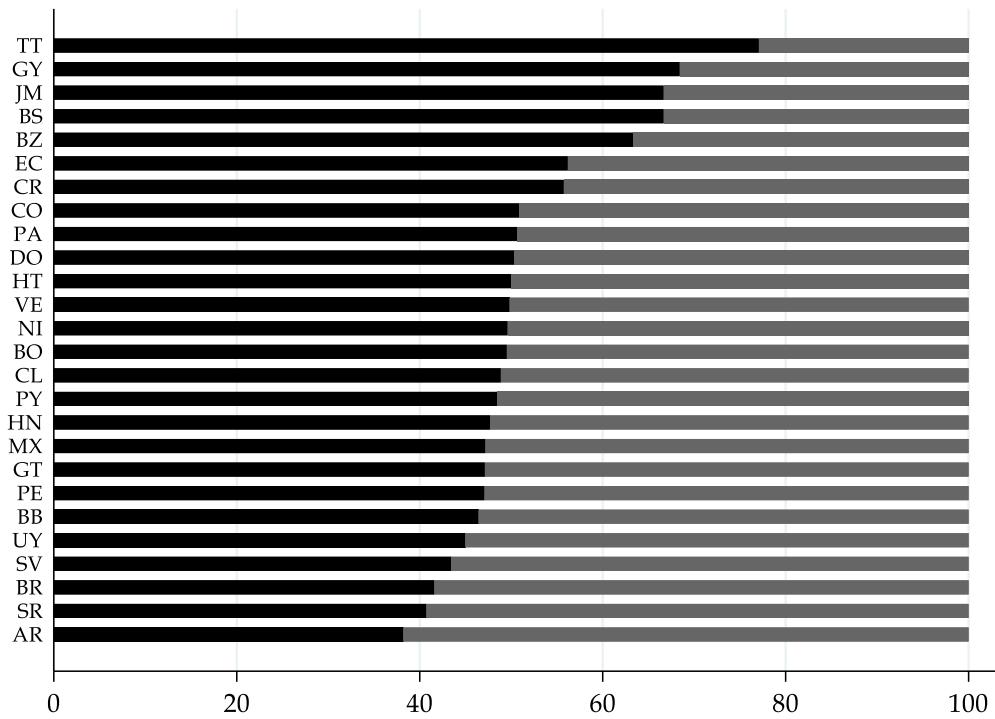
Figure 3
Share Firms Led by Women
ConnectAmericas, 2014-2021



Source: Authors' calculations based on data from *ConnectAmericas*. Only companies that report ownership by gender are included.

Note: The figure on the right is based on a regression of an indicator of firms' ownership by gender on country-sector fixed effects—which account for the asymmetric distribution of firms across countries and sectors—and year fixed effects. The diamonds correspond to the estimated coefficients on the year variables and the bars around them the respective confidence intervals at alternative levels (90%, 95%, and 99%).

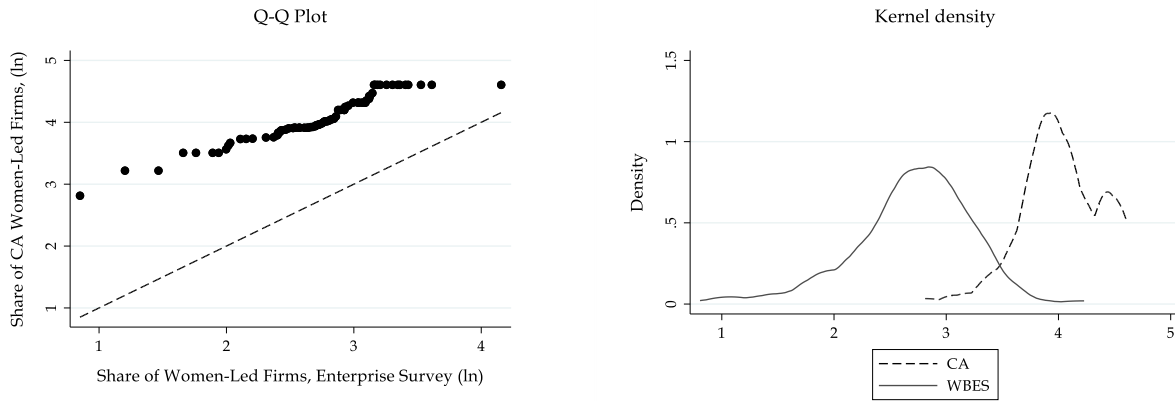
Figure 4
Share of Firms Led by Women, by Country
ConnectAmericas, 2021



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

Note: Black corresponds to women-managed firms, whereas grey corresponds to men-owned firms. Only companies that report ownership by gender are included.

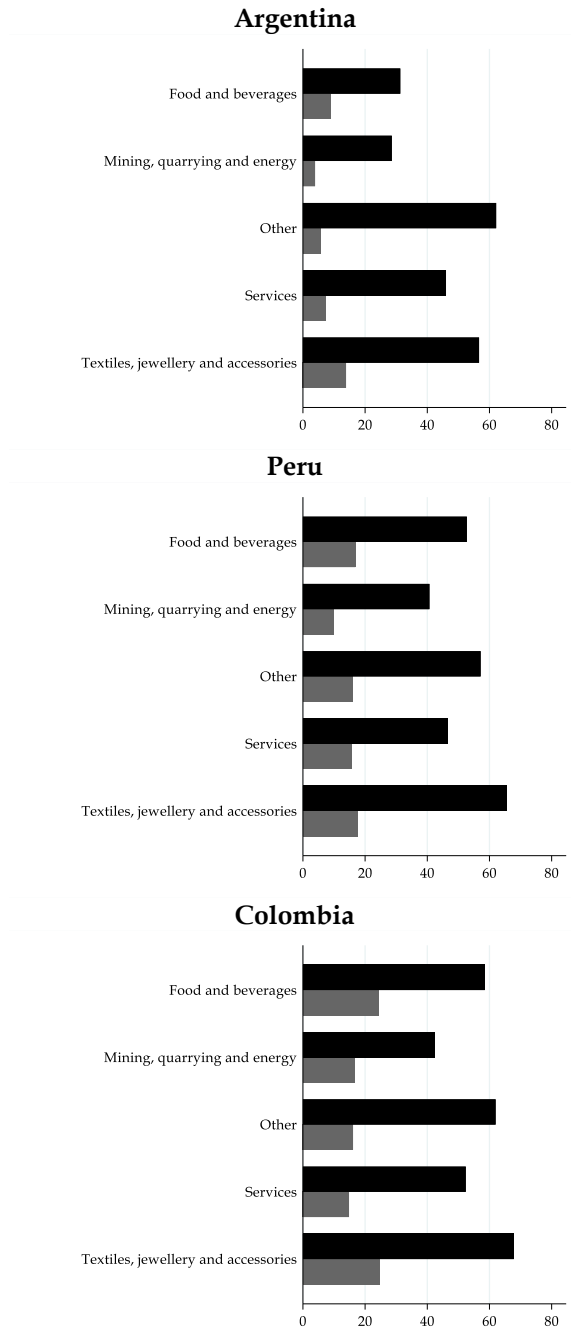
Figure 5
Share of *ConnectAmericas* Firms Led by Women
vs. Overall Share of Firms Led by Women, across Countries



Source: Authors' calculations based on data from *ConnectAmericas* and World Bank *Enterprise Surveys*.

Note: Only countries with data on gender from both *ConnectAmericas* and *Enterprise Surveys* are included. The last available data is used for each country.

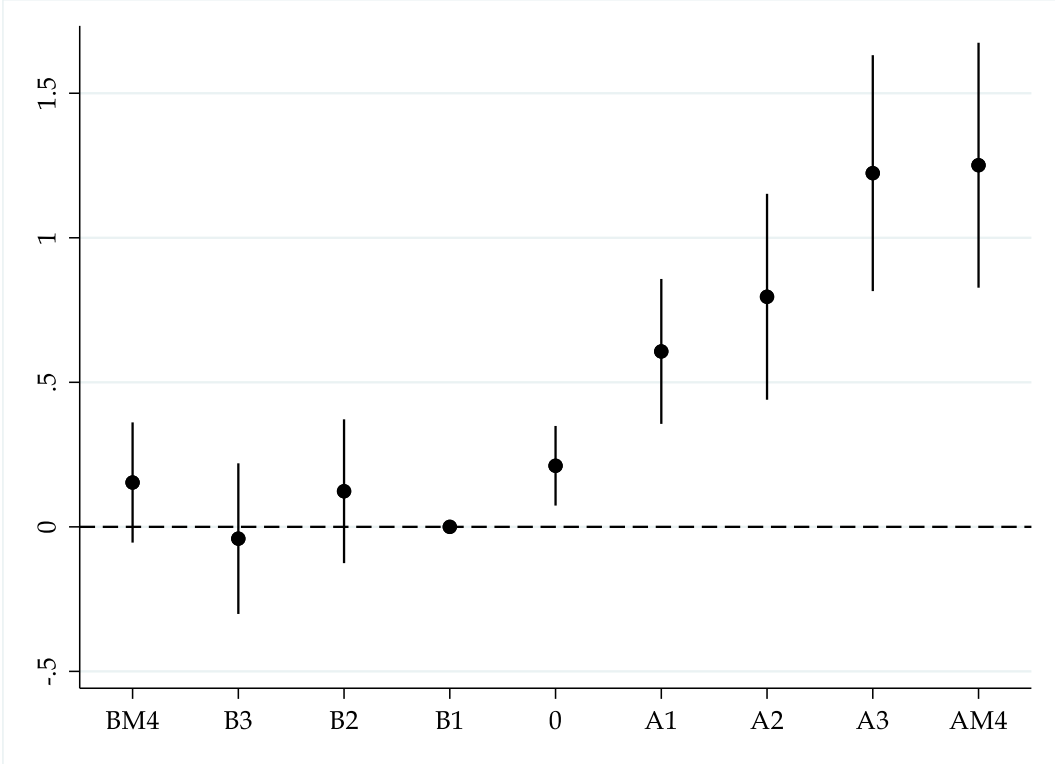
Figure 6
Share of *ConnectAmericas* Firms Led by Women
vs. Overall Share of Firms Led by Women,
across Country-Sectors



Source: Authors' calculations based on data from *ConnectAmericas* and World Bank *Enterprise Surveys*.

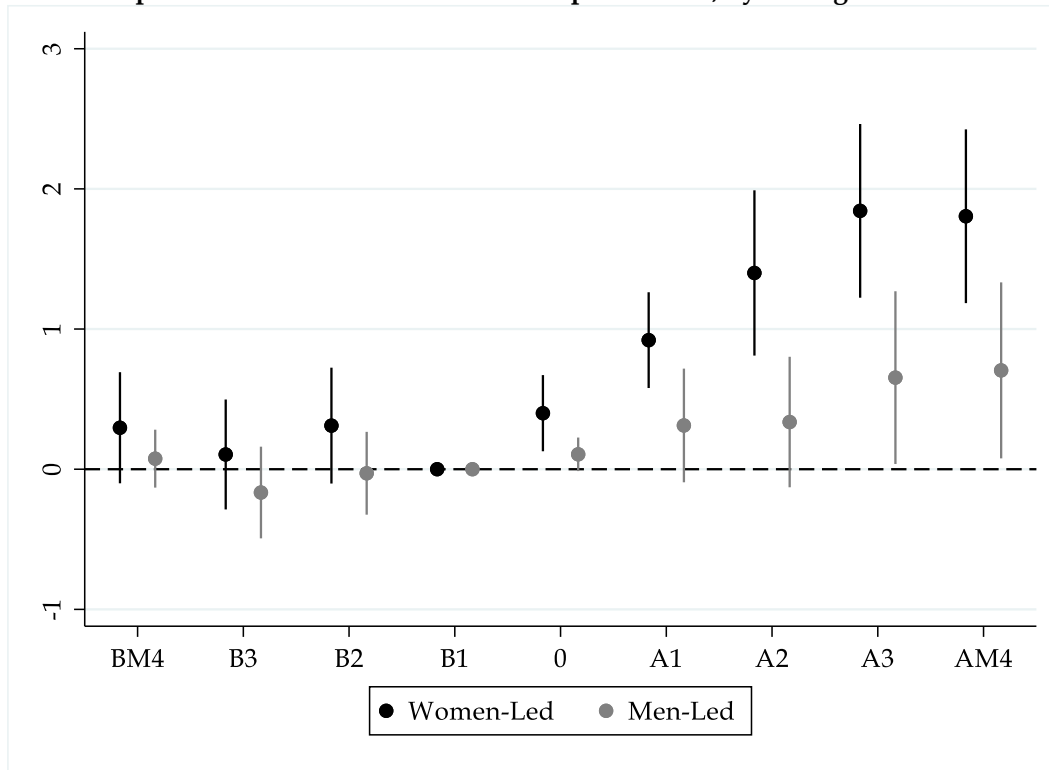
Note: The black bars show the shares of women-managed firms in *ConnectAmericas*, whereas the grey bars show the share of women-managed firms in the economy as a whole. Only countries with the largest number of firms in *ConnectAmericas* and with sectoral data on gender from both *ConnectAmericas* and *Enterprise Surveys* are included. The last available data is used for each country.

Figure 7
Replication of Event Study in Carballo et al. (2022)
The Impact of *ConnectAmericas* on Firm Export Values



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

Figure 8
Event Study
The Impact of *ConnectAmericas* on Firm Export Values, by Management Gender



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

Table 1. Descriptive Statistics on *ConnectAmericas* and Exports

Year	Semester	Number of Peruvian Firms in <i>ConnectAmericas</i>	Of which: Exporting Firms			
			Total		Of which: Women-Led	
			<u>Number</u>	<u>Share</u>	<u>Number</u>	<u>Share</u>
2014	1	22	1	0.045	1	1.000
2014	2	127	4	0.031	2	0.500
2015	1	257	10	0.039	6	0.600
2015	2	432	21	0.049	11	0.524
2016	1	773	29	0.038	16	0.552
2016	2	1,646	56	0.034	31	0.554
2017	1	2,420	83	0.034	46	0.554
2017	2	3,224	250	0.078	124	0.496
2018	1	4,268	376	0.088	183	0.487
2018	2	4,697	475	0.101	225	0.474

Sources: *ConnectAmericas* and SUNAT, 2014-2018.

Table 2. The Impact of *ConnectAmericas* on Firm Exports

	Export Value		
<i>ConnectAmericas</i>	0.172*** (0.0502)	0.164*** (0.0474)	0.205*** (0.0633)
	Export Weight		
<i>ConnectAmericas</i>	0.154*** (0.0558)	0.162*** (0.0496)	0.205*** (0.0630)
	Unit Value		
<i>ConnectAmericas</i>	0.0176 (0.0214)	0.00197 (0.0263)	-0.00005 (0.0322)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Time-Varying Firm-Level Control Variables	Yes	Yes	No
Firm-Time Trend	No	Yes	No
Firm-Year Fixed Effects	No	No	Yes
Region-Sector-Year Fixed Effects	Yes	Yes	No
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	627,530	627,530	627,530

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

The table presents OLS estimates of alternative specifications of equation (1). The sample includes exporting firms in *ConnectAmericas* that report the gender of the management team and all exporting firms that are not registered with the platform. 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 panel, 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: firm-product-destination fixed effects, region(province)-sector(4-digit ISIC)-year, product-destination-semester 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 2: firm-product-destination fixed effects, region(province)-sector(4-digit ISIC)-year, product-destination-semester 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 3: firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (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 3. The Impact of *ConnectAmericas* on Firm Exports, by Management Gender

		Export Value		
<i>ConnectAmericas</i> *	Women-Led Firms	0.214*** (0.062)	0.270*** (0.082)	0.389*** (0.130)
<i>ConnectAmericas</i> *	Men-Led Firms	0.133* (0.077)	0.086* (0.052)	0.101* (0.055)
Difference (Women-Led - Men-Led)		0.081	0.184*	0.288**
<i>p-value</i>		0.412	0.059	0.042
		Export Weight		
<i>ConnectAmericas</i> *	Women-Led Firms	0.150** (0.074)	0.214** (0.084)	0.320*** (0.119)
<i>ConnectAmericas</i> *	Men-Led Firms	0.159* (0.082)	0.124** (0.061)	0.140** (0.069)
Difference (Women-Led - Men-Led)		-0.009	0.090	0.180
<i>p-value</i>		0.892	0.426	0.188
		Unit Value		
<i>ConnectAmericas</i> *	Women-Led Firms	0.064*** (0.024)	0.056** (0.025)	0.069*** (0.024)
<i>ConnectAmericas</i> *	Men-Led Firms	-0.025 (0.029)	-0.038 (0.038)	-0.039 (0.046)
Difference (Women-Led - Men-Led)		0.089**	0.094**	0.108**
<i>p-value</i>		0.019	0.039	0.034
Firm-Product-Destination Fixed Effects		Yes	Yes	Yes
Time-Varying Firm-Level Control Variables		Yes	Yes	No
Firm-Time Trend		No	Yes	No
Firm-Year Fixed Effects		No	No	Yes
Region-Sector-Year Fixed Effects		Yes	Yes	No
Product-Destination-Semester-Year Fixed Effects		Yes	Yes	Yes
Observations		627,530	627,530	627,530

Source: Authors' calculations based on data from SUNAT, PROMPERU, and *ConnectAmericas*. The table presents OLS estimates of alternative specifications of equation (2). The sample includes exporting firms in *ConnectAmericas* that report the gender of the management team and all exporting firms that are not registered with the platform. 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 panel, respectively). The main explanatory variables are the interaction between a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise and a binary indicator that takes the value of one if the firm is managed by a woman and zero otherwise and the interaction between a binary indicator that takes the value of one if the firm was registered with *ConnectAmericas* in the semester in question and zero otherwise and a binary indicator that takes the value of one if the firm is managed by a man and zero otherwise. Column 1: firm-product-destination fixed effects, region(province)-sector(4-digit ISIC)-year, product-destination-semester 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 2: firm-product-destination fixed effects, region(province)-sector(4-digit ISIC)-year, product-destination-semester 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 3: firm-product-destination fixed effects, firm-year fixed effects, and product-destination-semester-year fixed effects included (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.

Appendix

ConnectAmericas is a purely informational business platform. It provides access to relevant information, but neither allows for direct transactions among firms nor incorporates the respective logistic solutions. Please see Carballo *et al.* (2022) for more detailed information on the platform.

It offers two main functions: *Learn* and *Connect*. The *Learn* function offers participating firms capacity-building services that furnish them with general trade information. These services include free online courses and webinars and training materials such as video testimonials and articles on trade-related matters; access to trade datasets and business self-evaluation tools; lists and contact data of public and private organizations that manage support programs for firms in countries where they operate; and the possibility to share relevant information and ask questions to the community or reply to posts by other firms.

The *Connect* function, instead, provides firms with specific commercial information. It primarily allows firms to search for a potential partner's profile and interact with members of their staff, either through a messaging system provided by the platform or through the availability of direct e-mail addresses. 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; and obtain information about face-to-face business events, some of which are organized by the platform.

Therefore, the purpose of the platform is manifold – it directly connects buyers and suppliers and offers generic information about trade procedures. Carballo *et al.* (2022) offer further evidence for the platform as reducing information and search frictions in international trade relying on data for the specific number of site visits by potential buyers searching for suppliers.

Table A1. Total Number of Firms in *ConnectAmericas*

Women-Led		Men-Led	
Large	Small	Large	Small
7	65	17	70

Source: *ConnectAmericas*, 2014-2018.

Table A2. The Impact of *ConnectAmericas* on Firm Exports, by Management Gender and Sector Representation of Women

	Export Value		
<i>ConnectAmericas</i> *			
Women-Led Firms*Above Median Representation	0.219*** (0.062)	0.271*** (0.083)	0.390*** (0.131)
Women-Led Firms*Below Median Representation	-0.144 (0.312)	-0.005 (0.257)	0.143*** (0.000)
<i>ConnectAmericas</i> *			
Men-Led Firms*Above Median Representation	0.030 (0.075)	0.041 (0.074)	0.094 (0.079)
Men-Led Firms*Below Median Representation	0.286** (0.145)	0.155* (0.087)	0.111 (0.076)
	Export Weight		
<i>ConnectAmericas</i> *			
Women-Led Firms*Above Median Representation	0.150** (0.075)	0.215** (0.084)	0.321*** (0.120)
Women-Led Firms*Below Median Representation	0.060 (0.376)	0.010 (0.209)	0.000 (0.000)
<i>ConnectAmericas</i> *			
Men-Led Firms*Above Median Representation	0.039 (0.069)	0.082 (0.074)	0.110 (0.083)
Men-Led Firms*Below Median Representation	0.332** (0.169)	0.188 (0.122)	0.181 (0.132)
	Unit Value		
<i>ConnectAmericas</i> *			
Women-Led Firms*Above Median Representation	0.068*** (0.023)	0.056** (0.026)	0.069*** (0.024)
Women-Led Firms*Below Median Representation	-0.204 (0.171)	-0.015 (0.162)	0.143*** (0.000)
<i>ConnectAmericas</i> *			
Men-Led Firms*Above Median Representation	-0.008 (0.030)	-0.041 (0.026)	-0.017 (0.032)
Men-Led Firms*Below Median Representation	-0.047 (0.059)	-0.033 (0.085)	-0.069 (0.104)
Firm-Product-Destination Fixed Effects	Yes	Yes	Yes
Time-Varying Firm-Level Control Variables	Yes	Yes	No
Firm-Time Trend	No	Yes	No
Firm-Year Fixed Effects	No	No	Yes
Region-Sector-Year Fixed Effects	Yes	Yes	No
Product-Destination-Semester-Year Fixed Effects	Yes	Yes	Yes
Observations	627,530	627,530	627,530

Sources: *ConnectAmericas* and SUNAT, 2014-2018.

Notes: Robust standard errors are reported in parenthesis. *** denotes significance at the 1 percent level; ** denotes significance at the 5 percent level; * denotes significance at the 10 percent level.