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Christian Volpe Martincus
Monika Sztajerowska
Mariana Santi

Inter-American Development Bank
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Consumers and Firms in International Trade*

Christian Volpe Martincus
Inter-American Development Bank and CESifo

Monika Sztajerowska
Paris School of Economics

Mariana Santi
Inter-American Development Bank

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Abstract

Modern theoretical and empirical analyses in international trade typically focus on firms as the sole trading actors. This is consistent with the fact that firms have traditionally accounted for the vast majority of trade and, hence, examining their behavior allows for fully characterizing trade margins and assessing their determinants. Emerging and rapidly growing trade modalities such as cross-border e-commerce have started to change this by making it easier for individuals to directly engage in international sales and purchases. However, to what extent and how consumers directly participate in and shape international trade has remained largely unknown due to data limitations. In this paper, we use a unique dataset consisting of the entire universe of import shipments that entered Peru in 2019 to provide novel evidence on the role of both consumers and firms as importers, characterize the distribution and patterns of their foreign purchases, and assess how gravity forces shape their trade decisions, thus filling in this gap in the literature.

Keywords: International Trade, Consumers, Firms, Gravity

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Corresponding Author: Christian Volpe Martincus, Inter-American Development Bank, 1300 New York Avenue, NW, Washington, DC 20577, United States of America. E-mail: christianv@iadb.org. Tel: +1 202 623 3199.

1. Introduction

The rise of digital technologies is fundamentally transforming the ways that economic agents search for goods and services and trade. In particular, these new technologies are changing how products are ordered and delivered. An expression of these changes has been the emergence and rapid expansion of digitally ordered goods from foreign countries and delivered across borders or cross-border e-commerce in goods. This new trade modality has been reportedly associated with a significant increase in the direct involvement of a new actor in international trade alongside firms: consumers (see, e.g., OECD, 2023; WTO et al., 2023).¹

However, the role of households and individuals in foreign sales and purchases is still largely unknown. In particular, we have very limited consistent evidence on how important consumers are in international trade, both overall and across relevant extensive and intensive margins; how their purchases are distributed; how these purchases respond to gravity forces; and whether and to what extent consumers differ from firms along these dimensions. Filling in these knowledge gaps and thus characterizing consumers' participation in international trade is a crucial first step to uncover and properly understand potentially new channels through which trade can affect the economy. These could include, for instance, changes in welfare as a result of a reduced distance between preferred and available product varieties and distributive effects across income and social groups (e.g., associated with differences in access to supporting technologies, digital skills, and gender) (see, e.g., Dolfen et al., 2023; and Neiman and Vavra, 2023).²

This paper aims to make such a first important step. We precisely quantify the relative participation of consumers and firms in international trade, both in general and along the intensive and extensive margins, characterize their purchases abroad, and assess potentially differential responses of these purchases to trade barriers and enhancers. To do so, we use a unique administrative dataset that consists of all import transactions into Peru in 2019 across all modes (e.g., air, both total and distinguishing between regular and express shipments; sea; and others) and accurately identifies the type of importers (i.e., individuals and firms). In this dataset, the express-delivery modality, which captures cross-border trade in parcels handled by couriers, can be considered a good representation of cross-border e-commerce (see López González and Sorescu, 2021).³

¹The International Air Transport Association (IATA) estimates that, in December 2019, e-commerce represented up to 15% of air cargo volumes.

²While admittedly the papers by Dolfen et al. (2023) and Neiman and Vavra (2023) primarily focus on domestic e-commerce, several of their insights (and variant thereof) could also potentially apply to cross-border e-commerce.

³Data on international credit and debit card transactions provide an alternative customs-based source of

Our main results can be summarized as follows. First, while they were responsible for a tiny fraction of total import values, consumers jointly accounted for more than 85% of international buyers, thus, playing a major role along the importer extensive margin. Further, consumers made up around 90% of all buyers importing by air and their purchases amounted to almost 2% of total air import values and more than 20% of those handled by couriers. Second, different from regular imports by air and those of firms, these purchases primarily belonged to the duty free segment (i.e., below US\$ 200) and, importantly, were highly concentrated in terms of geographical origins, with two countries (the United States and China) accounting more than three quarters of the total import value. Precisely in these origin countries, consumers represented the majority of importers. Third, firms made a substantial use of such a trade modality. Firms importing via this channel tend to be different from firms importing via regular imports. These firms are typically larger and older, are more likely to be exporters, and tend to be more connected with foreign affiliates of multinational firms operating in the country and with other domestic exporters and importers. In addition, their import shipments are more evenly distributed across segments (i.e., below and above the duty free threshold) compared to those of consumers. Fourth, like their firms' counterparts, consumers' imports increased with the size of the origin countries and decreased with the distance to these countries. Yet, unlike those of firms, consumers' imports were not affected by the presence of preferential trade agreements between Peru and the source countries. The reason for the latter is that, as mentioned above, their purchases entered Peru without paying duties anyway, having been concentrated in the low-value segment. We contribute to three main strands of the literature. First, we add to a large number of empirical and theoretical papers that, starting with Bernard and Jensen (1995) and Melitz (2003), have provided rigorous evidence on, and solid model-based explanations of, the role played by firms in international trade. We document the direct involvement of an emerging and increasingly important economic actor in international trade: the consumers. More precisely, we quantify consumers' trade, both in general and along relevant margins including market penetration in terms of number of consumers reached by foreign firms (see Arkolakis, 2010); characterize this trade; and assess how it responds to standard gravity forces relative to that of firms.

Second, we complement a growing set of studies on the effects of digital technologies, in general, and digital platforms and cross-border e-commerce, in particular (see, e.g., Lendle and Vézina, 2015; Lendle et al., 2016; Chen and Wu, 2021; Carballo et al., 2022; and Bai et al., 2023). Due to data limitations, most of these studies are either

information on the patterns and evolution of cross border e-commerce (see Carballo and Volpe Martincus, 2022; and Carballo et al., 2022).

not able to distinguish firms and individuals among sellers or buyers or are restricted to one of them. Our data, instead, allows us to precisely identify both firms and consumers and, thus, compare their trade patterns and study whether and how these are differentially influenced by gravity forces.

Third, given the importance of air-shipping and timeliness in consumers' international trade, our paper also speaks to a series of studies exploring the relationship between time and trade, in general, and intermediated by public sector interventions such as customs processing, in particular (see, e.g., Evans and Harrigan, 2005; Freund et al., 2010; Hummels and Schaur, 2013; Hornok and Koren, 2015; Volpe Martincus et al., 2015; and Fernandes et al., 2019). Using our rich and detailed data, we supplement these studies by presenting new facts on how air trade shipments are distributed across two main modalities, express and regular, including who use them and to what extent.

The remainder of the paper is organized as follows. Section 2 describes the dataset and how consumers' and firms' international trade is measured. Section 3 characterizes the role of both consumers and firms in the extensive and intensive margins of international trade. Section 4 presents a series of stylized facts on firms and consumers' imports. Section 5 shows how these imports respond to gravity forces. Section 6 concludes.

2. Measuring Consumers' and Firms' International Trade

Quantifying and characterizing the role of consumers in international trade, both in general and relative to that of firms in particular, have remained thus far an elusive goal. The reason is twofold. First, involvement of households and individuals is generally not adequately covered by traditional data sources, which are primarily centered on large firms. Second, such an involvement is associated with large number of low-value trade in goods, which may elude methods of tracking merchandise trade based on higher value thresholds (see, e.g., WTO et al., 2023).⁴ In this paper, we resort to a unique dataset to make an important step forward in addressing these issues.

We use two main transaction-level databases kindly provided by Peru's national tax and customs agency SUNAT and Peru's national trade, investment, and tourism promotion agency PROMPERU. The first database comprises the entire universe of regular import shipments that entered Peru in 2019. Each record reports the importer ID and includes information on the product (HS6-digit code and the respective description), the origin country, the transportation mode, the customs office of entry, and the value

⁴Countries set different threshold values below which no import duties or taxes are levied or *de minimis* values. Higher *de minimis* values are associated with larger firms' exports to the respective imposing countries (see Volpe Martincus and Rodriguez Chatruc, 2019).

in US dollars. Importers can be either individuals, hereafter consumers (*natural persons*), or firms (*legal persons*). Their type can be primarily identified based on their ID type or number. Thus, consumers can import using either their tax ID, which always starts with "1"; or their personal ID (e.g., National Identity Document–DNI for its acronym in Spanish and passport), whereby the latter only applies when they import up to three times a year, with each transaction not exceeding US\$ 1,000 in FOB terms, or once a year through a single transaction whose FOB value is between US\$ 1,000 and US\$ 3,000. Firms, in turn, can only import using their tax IDs, which always start with "2".

The second database covers the entire universe of postal import shipments into Peru under the fast delivery shipments regime (*Envíos de Entrega Rápida–EER for its acronym in Spanish*) in the same year. As mentioned above, imports under this modality can be considered a good approximation for cross-border e-commerce.⁵ These shipments encompass all transactions involving goods purchased abroad that are valued less than US\$ 2,000 and are shipped and delivered by (*couriers*).⁶ More specifically, the regime distinguishes between import shipments for up to US\$ 200 that enter the country without paying any duty (National Tariff Schedule Code 9809.00.00.20) and those import shipments for more than US\$ 200 and less than US\$ 2,000 that are subject to an *ad valorem* duty of 4% and the general sales tax (IGV for its acronym in Spanish) of 18% (National Tariff Schedule Code 9809.00.00.30).⁷ This data identifies the type of importer (consumer or firm), the product (description), the origin country, the transport mode (all shipments were transported by air), the customs office of entry (all shipments arrived at Peru's main international airport in Callao), and the value in US dollars. Goods' descriptions have been consistently mapped into product-specific, 4-digit HS codes following a consistent procedure.⁸

⁵Digitally ordered trade or *cross-border e-commerce* includes the international sales or purchases of goods and services conducted over computer networks by methods designed for the purpose of receiving or placing of orders (e.g., web, extranet or electronic data interchange -EDI-) (see OECD et al., 2020). While we cannot explicitly verify whether the respective transactions were made using these means, available evidence indicates that there is a strong correlation between growth in cross-border e-commerce and growth in cross-border trade in parcel (see López González and Sorescu, 2021).

⁶The regime also covers transactions consisting of non-commercial documentation and publications. These are properly identified in the data and removed from the sample to focus only on goods.

⁷Shipments whose goods have been valued US\$ 3,000 or less at customs are treated like the latter for tax purposes. The limits are higher for imports of certain medications for individuals who are legally accredited as patients needing the respective treatment (US\$ 10,000) and for re-imports in the same status provided that the respective export was made under the same regime (US\$ 5,000).

⁸This procedure involved applying a matching algorithm after performing several text cleaning steps (e.g., removing plurals, accents, symbols, numbers, and words such as "las demas") and an ulterior extensive clerical review. The information contained in the data did not allow us to accurately establish the products involved in the shipments at a higher level of disaggregation of the HS classification (e.g., HS 6-digit codes). As a result and for consistency, the entire analysis, which covers imports via courier but also regular imports (which are reported according to finer HS codes), was conducted at the HS 4-digit level. Additional details are available from the authors upon request.

3. The Extensive and Intensive Margins of International Trade: Firms vs. Consumers

Using the data described above, this section presents novel evidence on: i) the size of the importer and transaction extensive margins when consumers are accurately accounted for; and ii) the relative importance of firms and consumers in total imports and in the aforementioned extensive margins, in general and across import modalities.

The upper panel of Table 1 characterizes imports into Peru in 2019. These imports amounted to almost US\$ 40 billion and consisted of cross-border purchases of approximately 1,300 (HS4) products from 190 origins. According to data that only considers firms, direct importers would have been only 40,000 and the total number of shipments would have been below 1 million. The actual picture is significantly different. The total number of importers was 280,000 and the total number of transactions was more than 1.5 million.

Importantly, while, as expected, firms drove most of the import values, consumers made up to 86% of the importers, i.e., more than 240,000 consumers imported directly goods from abroad.⁹ This was approximately 6 times larger than the number of importing firms and amounted to 1.1% of the adult population of the country. Also noteworthy, with 600,000 cross-border purchases, consumers accounted for 38% of the import transactions (see Column "All Transport Modes", Panel "Firms vs. Consumers" in Table 1).¹⁰

The relative importance of consumers is larger in imports by air and, even more, in imports by air handled by courier, which is a modality under which consumers primarily participate in international trade. Thus, imports by air accounted for 13% of the total import value in 2019, but, remarkably, for 95% of the importers and 75% of the shipments.¹¹ Within those imports, consumers' shares were 2% for import values, 90% for the number of international buyers, and 50% for the number of shipments see Column "Air-All", Panel "Firms vs. Consumers" in Table 1).

The specific portion of these imports by air that were handled by couriers made up 7% of the import value, 98% of the international buyers, and 74% of the cross-border import shipments. In this case, consumers accounted for 21% of the import values, 90% of the buyers, and more than two-thirds of the shipments (see Column "Air-Courier", Panel "Firms vs. Consumers" in Table 1).

⁹Unfortunately, our data does not allow to measure purchases by consumers from intermediaries at the level of this analysis.

¹⁰In this paper, we use shipments and transactions interchangeably. The same applies to importers and international buyers.

¹¹Note that 97% of the HS4 products are at least partially imported by air and that there are imports by air from more than 92% of the origin countries.

In short, whereas firms are by far the leading actor in terms of import value, consumers play a major role in terms of the international buyer margin and, to a significant extent, also in terms of the shipment import margin. This is particularly true for courier trade, where consumers are an important player.

Consistent with this, decomposing the (log) values imported from a origin given country into, and regressing it on, the (log) number of importers and the (log) average import value per importer, allows to see that the importer margin accounts for more than 70% of air import value variation across origins and almost 74% of those through the courier channel in the case of consumers, but only around 55% for firms (see the bottom panel of Table 1).

Now, it is worth noting that consumers did not outnumber firms in all origin countries. The average (median) share of consumers in the total number of importers across origin countries was 0.27 (0.20) for all imports by air and reached 0.41 (0.35) under the courier modality. In approximately 30% of the origins, the share of consumers exceeded 0.50 and in at least 5% of them, it was one (see Figure A1 in the Online Appendix).¹² Thus, the overall prevalence of consumers in the extensive margin of international trade can be traced back to a subset of origin countries. As expected, these include large economies with large firms such as the United States, China, and the United Kingdom, where the share of consumers was 0.92, 0.85, and 0.76, respectively.¹³

4. Characterizing Consumers' and Firms' International Trade

This section characterizes consumers' and firms' international trade in terms of the size, the geographical patterns, and the composition of their foreign purchases and typifies firms engaged in imports via courier relative to those that do not participate in this trade modality. These characteristics are presented in the form of four new facts.

Fact 1: The mass of consumers' imports is concentrated in duty-free transactions, whereas firms' imports are more evenly distributed.

Duty-free transactions, i.e., shipments whose value was up to 200 US\$, amounted to almost 70% of consumers' total import value and 93% of their total number of shipments via couriers, with the mean import value being 136 US\$. In the case of firms,

¹²This figure also shows that the distributions of the number of importing consumers and the number of importing firms across origin countries resemble each other for imports by air in general and imports by air via couriers in particular. As expected, in the case of regular imports by air, firms prevail across origins, with the consumers only accounting for a small share of the total number of importers in most origin countries.

¹³Countries' GDP is positively associated with the number and size of digital platforms (see Costa et al., 2021).

shipments under 200 US\$, which were not subject to duties, and shipments above US\$ 200 (and below US\$ 2,000), which were subject to an *ad valorem* duty of 4% (and the general sales tax rate of 18%), accounted for 3% and 30% of the import values and 52% and 38% of the number of purchases via courier, respectively (see Figure 1).

Fact 2: Consumers' imports are more concentrated in terms of origins than firms' imports.

The two most important origin countries for consumers, the United States and China, jointly accounted for more than three quarters of consumers' total import value under the courier modality. The same countries, which were also the main origins for firms, were responsible for only 46.4% of firms' imports under such a modality. The share of the top five origins reach 91% and 64% for consumers and firms, respectively. The geographical concentration was similar in terms of number of shipments (see Figure 1).

Fact 3: Consumers' imports primarily consist of consumers goods, whereas firms' imports mainly involve industrial supplies.

Consumer goods represented at least 35% of consumers' imports (and around 45% in the case of regular air imports). In particular, footwear goods are the largest single product category imported by consumers. It accounted for almost 24% of their foreign purchases under the courier modality and, together with apparel, for almost 30% of these purchases. In the case of firms, in turn, capital and intermediate goods, with a joint share above 80%, prevailed among their imports. More specifically, machinery and electronics, optical instruments, chemical products, metals made up together approximately 70% of firms' imports via couriers and, noteworthy, almost 90% of their regular air imports (see Table 2).

Fact 4: Firms importing via couriers are typically intermediaries and are larger, older, and have more linkages with internationalized counterparts

Approximately, 45% of the firms that imported through the courier modality were either retailers or wholesalers and less than 20% were manufacturers. On average, these firms had 140 employees and were 14 years old. Around 22% of these firms were exporters, 21% sold to and 48% bought from foreign affiliates of multinational firms active in Peru, and 33% sold to and 52% bought from domestic exporters. These firms also had more linkages with other importers: 51% sold to domestic importers and 67%

bought from them. These patterns hold across importing firms' sector categories (e.g., agriculture, manufacturing, etc.).¹⁴

As a reference, the average firms that imported by air (regular) and sea had 92 and 70 employees and were 12.5 and 12 years old, respectively. These firms were less likely to export (about 14% of them did it) and had less linkages with foreign affiliates of multinational firms and domestic exporters. Among regular air importers, 16% sold to and 40% bought from foreign affiliates, 27% sold to and 44% bought from domestic exporters, 43% sold to and 59% bought from domestic importers.¹⁵

5. The Gravity of Consumers' and Firms' International Trade

To examine the determinants of imports in general and whether and how they differ for firms and consumers, in particular, we estimate the following gravity equation at the origin level across modes and types of importers:

$$M_c^{R,B} = \exp\left\{\sum_{i=0}^I \alpha_i^{R,B} X_c^i\right\} + \epsilon_c \quad (1)$$

where c denotes country of origin, $R = All, Regular, Courier$ represents air import regimes, and $B = Firms, Consumers$ corresponds to the different types of importers, i.e., firms and consumers. The dependent variable, M , is then the import value (number of importers, products, shipments) through each specific import modality (air, air regular, air courier) for each specific type of importer (firms, consumers). The main explanatory variables, $X_c = \{Distance_c, GDP_c, Contiguity_c, Language_c, PTA_c\}$, is a vector of variables that characterize origin countries in general and in relationship with the importing country, Peru, in particular: $Distance_c$ is the natural logarithm of the distance between Peru and origin country c ; GDP_c is the natural logarithm of the gross domestic product of origin country c (based on purchasing power parity values), which captures the size of that economy; $Contiguity_c$ is a binary indicator that takes the value of one if Peru and the origin country c share a border and zero otherwise; $Language_c$ is a binary indicator that takes the value of one if Peru and the origin country c have the same official language and zero otherwise; PTA_c is a binary indicator that takes the value of one if Peru and the origin country c have a preferential trade agreement (PTA) and zero otherwise; and ϵ is the error term. Standard errors are robust to heteroscedasticity.

¹⁴Data on firms' sector of activity, year of establishment, employment, exports, and domestic firm-to-firm sales and purchases come from SUNAT and also correspond to 2019 (see Scattolo and Volpe Martincus, 2024).

¹⁵The respective figures for sea importers were: 14%, 42%, 26%, 47%, 47%, and 65%.

Table 3 presents Poisson estimates of Equation (1) when imports values is the dependent variable, both for all imports by air and separately for imports by air under the regular regime and imports by air handled by couriers, and for both all importers and separately for firms and consumers.¹⁶ These estimates reveal that, as expected, imports are positively associated with the size of the origin countries as proxied by their GDP across modes and importer categories. In contrast, other factors' effects vary across regimes and, importantly, importers.¹⁷ Thus, overall firms' and consumers' regular imports by air respond similarly to gravity factors, but, in the case of imports via courier, such responses differ across importer categories. More precisely, while both firms' and consumers' imports under the express modality decrease with the distance to the origin countries and increase with the size of such countries as proxied by their GDP as in standard gravity model estimations, these show differential reactions to contiguity and tariff preferences.¹⁸ In particular, different from their business' counterparts, consumer imports are smaller from neighboring countries. This reflects that most important origin countries in this trade modality are far away from Peru and, hence, are not in its vicinity. Importantly, PTAs only matter for firms' imports. In this regard, note that, as shown in the previous section, a significant fraction of consumers' import shipments were below US\$ 200 and hence were not subject to tariffs anyway, whereas firms' foreign purchases via courier consisted of a relatively large number of transactions above this amount, thus being subject to at least a 4% *ad valorem* tariff if originated in a country with which Peru did not have trade agreement.

Table 4 presents the respective estimates of the effects of gravity factors on several measures of the extensive margin of trade: number of importers, number of products, and number of shipments. While origin countries' size is always positively related to these extensive margin import outcomes across trade modalities and, importantly, across importer types, distance only seems to negatively affect the number of shipments and, marginally, the number of consumers (but not firms) importing into Peru from given countries. PTAs have a consistent positive impact on firms' imports under the courier modality (as well as under the regular modality) across all three extensive margins: number of buyers, number of products, and number of shipments. However, PTAs do not seem to generally make a difference for consumers' imports but for the product extensive margin. This could be potentially related with the relatively few con-

¹⁶The number of observations is slightly lower than the number of origin countries reported in Table 1 because data on gravity variables is missing for a few small territories.

¹⁷Distance only seems to have a consistent negative impact on import values under the courier modality, being particularly strong in the case of the consumers.

¹⁸Results are similar if GDP per capita is included as an additional covariate. These results are available from the authors upon request.

sumers' transactions above the US\$ 200 threshold consisting of specific products with high tariffs when not imported under preferences. Hence, PTAs are associated with increased firms' imports in general and through expansions along all three relevant margins, i.e., buyers, products, and transactions, but do not drive consumers' imports except in terms of number of products.¹⁹

We have also carried out similar estimations at the origin country-product level and including product fixed effects to account for differences in product import patterns across modes and type of buyers. The results are reported in Table A1 in the Online Appendix. These results are fully in line with those presented here.

Finally, we have estimated a variant of Equation (1) whereby the dependent variable is the share of consumers in the total number of importers from a given origin country, for both all imports by air and separately for regular imports by air and imports by air via courier. The OLS estimates are presented in Table A2 in the Online Appendix. These estimates indicate that the share of consumers is consistently higher in larger origins, especially for imports under the express modality.

6. Concluding Remarks

Informal accountings indicate that digitalization has been associated with a rapid expansion of new trade modalities such as cross-border e-commerce and, as a consequence, with an increased involvement of consumers in international trade. However, rigorous evidence on such a participation in cross-border transactions and how it compares with that of firms has been scarce due to data limitation. In this short paper, we take advantage of a unique administrative dataset that consists of all import transactions in a country, Peru, in 2019, and notably includes those under the courier modality (a proxy of cross-border e-commerce), to characterize and explore the determinants of consumers' import patterns along with those of firms.

We find that, while they account for approximately only 2% of total air imports, consumers amount to around 90% of the importers by air and a 85% of total international buyers, thus being major actors along the extensive margin. Such a consumers' prevalence in this margin is driven by a subset of economies, including large countries such as the United States and China where their share in the total number of importers

¹⁹Contiguity and common language do not have consistent effects. Common language appears to have no incidence on the number of products and to be negatively associated with the number of consumers and consumers' purchases, in consonance with its effects on value, and positively associated with number of firms and firms' purchases under the express modality. Common language between Peru and the origin countries favors an increase in the base of importing firms and a diversification of consumers' purchases in terms of products.

significantly exceeds 0.50. This is related to the fact that consumers' purchases are substantially more concentrated in terms of origins than those of firms, with two large countries, the US and China, supplying more than 75% of their imports via courier. In addition, an important portion of consumers' purchases are under the duty pay threshold, so, unlike their business' counterparts, do not respond to tariff preferences. Firms imports via couriers, instead, are more evenly distributed around such a threshold and are therefore influenced by the existence of trade agreements between Peru and source economies. Noteworthy, firms using this trade modality are larger, older, and more internationalized.

Our analysis can be extended in several ways. Thus, for instance, a quantitative model can be developed for consumers' and firms' decision to import and modal choice to conduct relevant counterfactual exercises to assess the implications of changes in the relative size of the economies, tariffs, transportation costs (e.g., parcel rates, which are set for specific partner countries for fixed periods), or exchange rates. Furthermore, as more data becomes available and additional years could be considered, the dynamics of consumers' and firms' trade growth could be worth examining. Moreover, with more detailed information, the extent to which new trade modalities are actually associated with access to new varieties and the existence of potential heterogeneous effects of gravity forces across both importer types (new vs. incumbents) and goods (differentiated vs. non-differentiated) could also be explored. In addition, the role of households and individuals as exporters could be studied. Finally, it would be worth evaluating the impact of the significant increase in the number of international lower-value parcels associated with the growth of cross-border e-commerce that must clear customs on border processing times and delays.

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Table 1

Imports by Transport Mode						
Indicator	All Transport Modes		Air		Other Modes	
		All	Regular	Courier		
Value		39,485	0.131	0.932	0.068	0.869
Importers		280,377	0.952	0.052	0.984	0.098
Shipments		1,506	0.739	0.263	0.737	0.261
Origins		190	0.921	0.858	0.800	0.884
Products		1,328	0.970	0.819	0.824	0.834
Firms vs. Consumers						
Value	<i>Firms</i>	0.993	0.982	0.997	0.788	0.994
	<i>Consumers</i>	0.007	0.018	0.003	0.212	0.006
Importers	<i>Firms</i>	0.141	0.108	0.904	0.096	0.857
	<i>Consumers</i>	0.859	0.892	0.096	0.904	0.143
Shipments	<i>Firms</i>	0.623	0.500	0.988	0.326	0.972
	<i>Consumers</i>	0.377	0.500	0.012	0.674	0.028
Origins	<i>Firms</i>	0.989	0.971	0.975	0.941	1.000
	<i>Consumers</i>	0.705	0.754	0.497	0.836	0.369
Products	<i>Firms</i>	0.998	0.998	0.994	0.991	0.997
	<i>Consumers</i>	0.784	0.686	0.473	0.680	0.644
Decomposition: Number of Importers vs. Average Imports, by Importer Type						
Number of Importers	<i>Firms</i>		0.536***	0.510***	0.559***	
			(0.018)	(0.016)	(0.025)	
	<i>Consumers</i>		0.705***	0.412***	0.735***	
			(0.041)	(0.040)	(0.040)	
Average Imports per Importer	<i>Firms</i>		0.464***	0.490***	0.441***	
			(0.018)	(0.016)	(0.025)	
	<i>Consumers</i>		0.295***	0.588***	0.265***	
			(0.041)	(0.040)	(0.040)	

Source: Authors' calculations based on data from Peru's national tax and customs agency SUNAT.

The top panel of the table presents aggregate statistics on import values, number of importers, number of shipments, number of origin countries, and number of products for all transportation modes and their distribution across modes (air both total and split in regular and courier, and other modes) and across type of importers (firms and consumers) for Peru in 2019. The bottom panel reports estimates of the regression $\ln Z_c = \alpha \ln M_c + \varepsilon_c$ at the origin country (c) level, where Z denotes either number of importers or average imports per importer and M corresponds to the respective import value, for air imports (all, regular, and courier) and type of importer. Standard errors are corrected for heteroscedasticity.

Table 2

Imports by Transport Mode, Origins, and Products								
Firms vs. Consumers								
Origins	All	Air		Products	All	Air		
		Regular	Courier			Regular	Courier	
<i>Firms</i>				<i>Firms</i>				
USA	0.189	0.183	0.306	ME	0.563	0.574	0.376	
China	0.297	0.305	0.158	OI	0.105	0.098	0.231	
EU27	0.186	0.181	0.273	Rest	0.331	0.328	0.393	
LAC	0.134	0.137	0.081	C-Goods	0.152	0.152	0.155	
Rest	0.193	0.194	0.182	KI-Goods	0.847	0.847	0.845	
<i>Consumers</i>				<i>Consumers</i>				
USA	0.479	0.199	0.542	FH	0.194	0.033	0.231	
China	0.269	0.430	0.232	TX	0.066	0.075	0.064	
EU27	0.071	0.167	0.049	Rest	0.740	0.892	0.705	
LAC	0.039	0.093	0.027	C-Goods	0.381	0.468	0.342	
Rest	0.143	0.111	0.150	KI-Goods	0.616	0.528	0.657	

Source: Authors' calculations based on data from Peru's national tax and customs agency SUNAT.

The table presents the distribution of import values across main origin countries (left panel) and across main product categories (right panel) for air imports (all, regular, and courier) and type of importer in Peru in 2019. LAC: Latin American and Caribbean countries; ME: Machinery and electronics; OI: Optical Instruments; FW: Footwear and handbags; TX: Textiles and apparel; C-Good: Consumer goods; and KI-Goods: Capital and intermediate goods.

Table 3
The Gravity of Firms' and Consumers' Trade: Values

	Air			Air: Regular			Air: Courier		
	All	Firms	Consumers	All	Firms	Consumers	All	Firms	Consumers
Distance	0.017 (0.182)	0.035 (0.185)	-0.852*** (0.296)	0.084 (0.192)	0.083 (0.192)	0.306* (0.174)	-0.851*** (0.134)	-0.774*** (0.117)	-1.136*** (0.352)
GDP	1.143*** (0.074)	1.139*** (0.075)	1.357*** (0.217)	1.146*** (0.078)	1.145*** (0.078)	1.449*** (0.092)	1.075*** (0.055)	1.020*** (0.046)	1.331*** (0.251)
Contiguity	1.092*** (0.377)	1.123*** (0.387)	-1.066 (0.723)	1.197*** (0.401)	1.195*** (0.402)	1.584*** (0.465)	-0.386 (0.259)	-0.143 (0.295)	-1.991** (1.010)
Common Language	0.528* (0.284)	0.541* (0.293)	-0.252 (0.727)	0.594* (0.314)	0.593* (0.315)	1.089*** (0.384)	-0.418 (0.404)	-0.384 (0.393)	-0.684 (0.890)
PTA	1.134*** (0.252)	1.146*** (0.255)	0.297 (0.497)	1.133*** (0.260)	1.133*** (0.259)	1.029** (0.487)	1.114*** (0.296)	1.361*** (0.315)	0.107 (0.510)
Observations	186	186	186	186	186	186	186	186	186

Source: Authors' calculations based on data from Peru's national tax and customs agency SUNAT.

The table presents PPML estimates of Equation (1) for air imports (all, regular, and courier) and type of importer using data from Peru in 2019. Standard errors are corrected for heteroscedasticity.

Table 4
The Gravity of Firms' and Consumers' Trade:
Number of Importers, Number of Products, and Number of Transactions

Number of Importers									
	Air			<i>Air: Regular</i>			<i>Air: Courier</i>		
	All	Firms	Consumers	<i>All</i>	<i>Firms</i>	<i>Consumers</i>	<i>All</i>	<i>Firms</i>	<i>Consumers</i>
Distance	-0.681** (0.345)	-0.164 (0.134)	-0.821* (0.424)	-0.144 (0.139)	-0.163 (0.145)	0.260* (0.146)	-0.725* (0.372)	-0.228 (0.163)	-0.827* (0.426)
GDP	1.112*** (0.173)	0.919*** (0.036)	1.180*** (0.247)	0.835*** (0.032)	0.822*** (0.033)	1.163*** (0.066)	1.154*** (0.203)	1.039*** (0.050)	1.181*** (0.249)
Contiguity	-0.728 (0.536)	0.608** (0.240)	-1.476* (0.816)	0.460 (0.386)	0.439 (0.398)	0.913*** (0.283)	-0.817 (0.618)	0.719*** (0.260)	-1.493* (0.823)
Common Language	0.202 (0.590)	0.644*** (0.234)	0.033 (0.805)	0.281 (0.305)	0.261 (0.317)	0.725*** (0.222)	0.230 (0.664)	0.889*** (0.276)	0.030 (0.811)
PTA	0.226 (0.378)	0.726*** (0.198)	0.015 (0.457)	0.897*** (0.217)	0.912*** (0.221)	0.536* (0.279)	0.149 (0.407)	0.614*** (0.225)	0.011 (0.459)
Observations	186	186	186	186	186	186	186	186	186

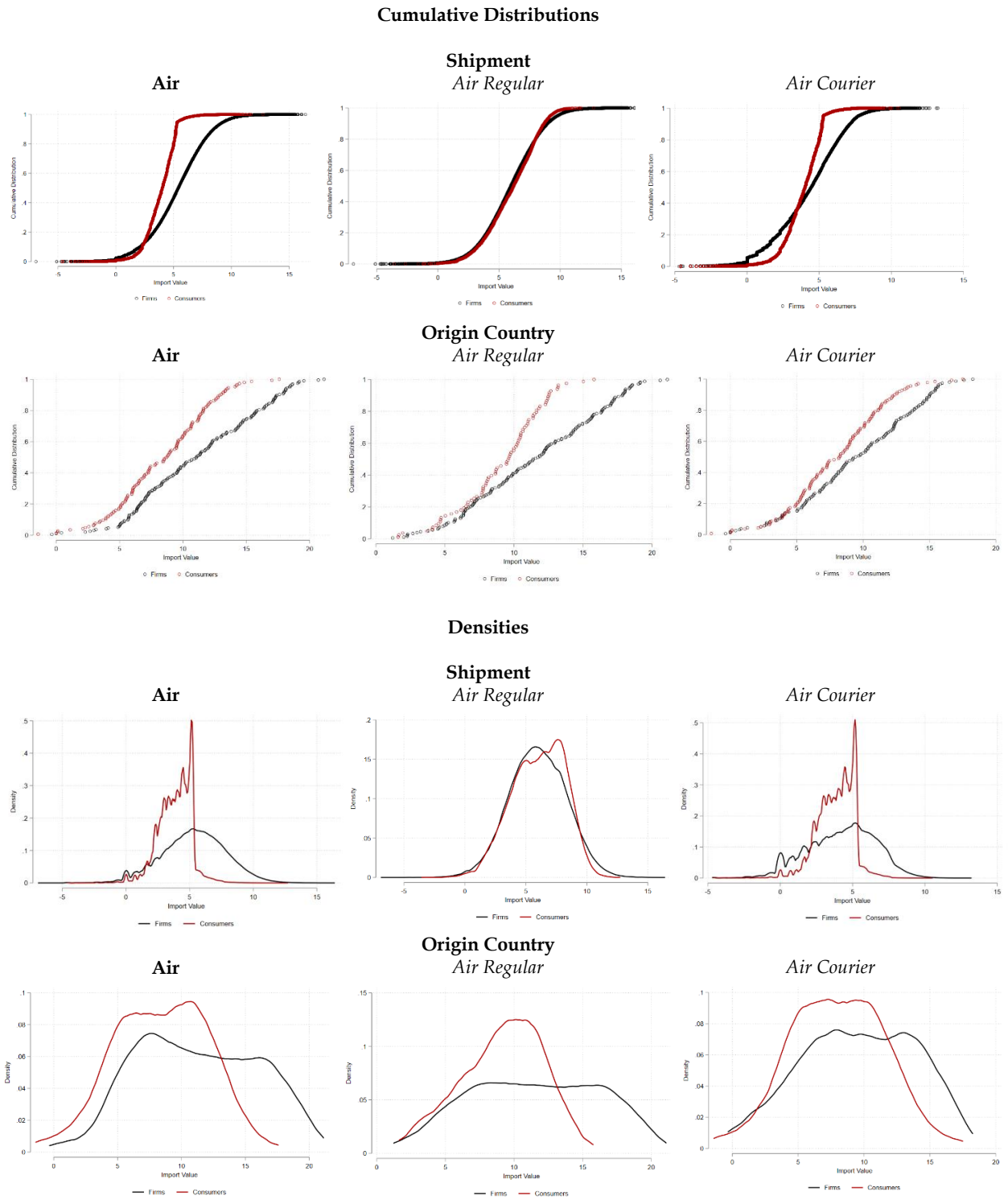
Number of Products									
	Air			<i>Air: Regular</i>			<i>Air: Courier</i>		
	All	Firms	Consumers	<i>All</i>	<i>Firms</i>	<i>Consumers</i>	<i>All</i>	<i>Firms</i>	<i>Consumers</i>
Distance	-0.219 (0.186)	-0.223 (0.197)	-0.198 (0.140)	-0.166 (0.195)	-0.168 (0.196)	-0.005 (0.137)	-0.273 (0.188)	-0.283 (0.203)	-0.224 (0.154)
GDP	0.517*** (0.043)	0.537*** (0.045)	0.650*** (0.037)	0.560*** (0.045)	0.559*** (0.045)	1.013*** (0.045)	0.538*** (0.044)	0.572*** (0.047)	0.629*** (0.040)
Contiguity	0.265 (0.304)	0.316 (0.319)	0.287 (0.196)	0.356 (0.363)	0.355 (0.367)	0.807** (0.341)	0.212 (0.290)	0.296 (0.313)	0.231 (0.200)
Common Language	0.332 (0.254)	0.323 (0.272)	0.697*** (0.190)	0.213 (0.317)	0.203 (0.319)	0.734* (0.412)	0.375 (0.246)	0.366 (0.270)	0.706*** (0.190)
PTA	0.831*** (0.186)	0.859*** (0.195)	0.509** (0.199)	0.892*** (0.199)	0.901*** (0.201)	0.485** (0.191)	0.851*** (0.202)	0.896*** (0.217)	0.522** (0.214)
Observations	186	186	186	186	186	186	186	186	186

Number of Shipments									
	Air			<i>Air: Regular</i>			<i>Air: Courier</i>		
	All	Firms	Consumers	<i>All</i>	<i>Firms</i>	<i>Consumers</i>	<i>All</i>	<i>Firms</i>	<i>Consumers</i>
Distance	-0.901*** (0.198)	-0.456*** (0.092)	-1.308*** (0.375)	-0.245* (0.126)	-0.254** (0.129)	0.502*** (0.165)	-1.082*** (0.274)	-0.623*** (0.130)	-1.320*** (0.378)
GDP	1.137*** (0.100)	1.002*** (0.032)	1.308*** (0.266)	0.862*** (0.034)	0.859*** (0.035)	1.212*** (0.084)	1.268*** (0.176)	1.205*** (0.054)	1.308*** (0.268)
Contiguity	-0.515 (0.330)	0.382* (0.200)	-2.160** (0.951)	0.274 (0.410)	0.262 (0.413)	1.235*** (0.305)	-0.739 (0.564)	0.575** (0.251)	-2.190** (0.963)
Common Language	-0.132 (0.420)	0.213 (0.221)	-0.570 (0.939)	0.072 (0.254)	0.063 (0.258)	0.817*** (0.223)	-0.081 (0.638)	0.532 (0.343)	-0.581 (0.946)
PTA	0.573** (0.284)	0.920*** (0.194)	0.024 (0.480)	1.000*** (0.224)	1.003*** (0.226)	0.750** (0.317)	0.352 (0.379)	0.807*** (0.227)	0.017 (0.481)
Observations	186	186	186	186	186	186	186	186	186

Source: Authors' calculations based on data from Peru's national tax and customs agency SUNAT.

The table presents PPML estimates of Equation (1) for air imports (all, regular, and courier) and type of importer using data from Peru in 2019. Standard errors are corrected for heteroscedasticity.

Figure 1
Cumulative Distributions and Densities of Imports, by Mode and Type of Importers, Shipment and Origin Levels



Source: Authors' calculations based on data from Peru's national tax and customs agency SUNAT. The figure presents cumulative distributions and kernel density estimates of the (the natural logarithm of the) import values per shipment and per origin country for air imports (all, regular, and courier) and type of importer in Peru in 2019.

Online Appendix

Table A1
The Gravity of Firms' and Consumers' Trade at the Origin Country-Product Level: Values

	Air			Air: Regular			Air: Courier		
	All	Firms	Consumers	All	Firms	Consumers	All	Firms	Consumers
Distance	-0.992*** (0.198)	-0.497*** (0.116)	-1.321*** (0.313)	-0.426*** (0.128)	-0.443*** (0.132)	0.207 (0.136)	-1.107*** (0.241)	-0.552*** (0.132)	-1.334*** (0.315)
GDP	1.216*** (0.105)	1.059*** (0.043)	1.364*** (0.232)	0.967*** (0.039)	0.960*** (0.039)	1.323*** (0.082)	1.292*** (0.149)	1.153*** (0.056)	1.365*** (0.234)
Contiguity	-0.656* (0.342)	0.387 (0.272)	-1.874** (0.827)	0.246 (0.422)	0.225 (0.429)	1.143*** (0.316)	-0.852* (0.482)	0.500* (0.268)	-1.907** (0.841)
Common Language	-0.048 (0.553)	0.193 (0.382)	-0.215 (0.886)	-0.116 (0.401)	-0.136 (0.407)	0.741** (0.344)	0.011 (0.656)	0.427 (0.415)	-0.225 (0.893)
PTA	0.556* (0.315)	0.957*** (0.226)	0.119 (0.459)	1.049*** (0.233)	1.055*** (0.236)	0.766** (0.325)	0.413 (0.371)	0.898*** (0.249)	0.113 (0.460)
Product Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	239,568	239,010	163,866	196,044	194,928	92,628	197,160	195,300	133,548

Source: Authors' calculations based on data from Peru's national tax and customs agency SUNAT.

The table presents PPML estimates of a variant of Equation (1) at the origin country-product level that include product fixed effects for air imports (all, regular, and courier) and type of importer using data from Peru in 2019. Standard errors are clustered by origin country.

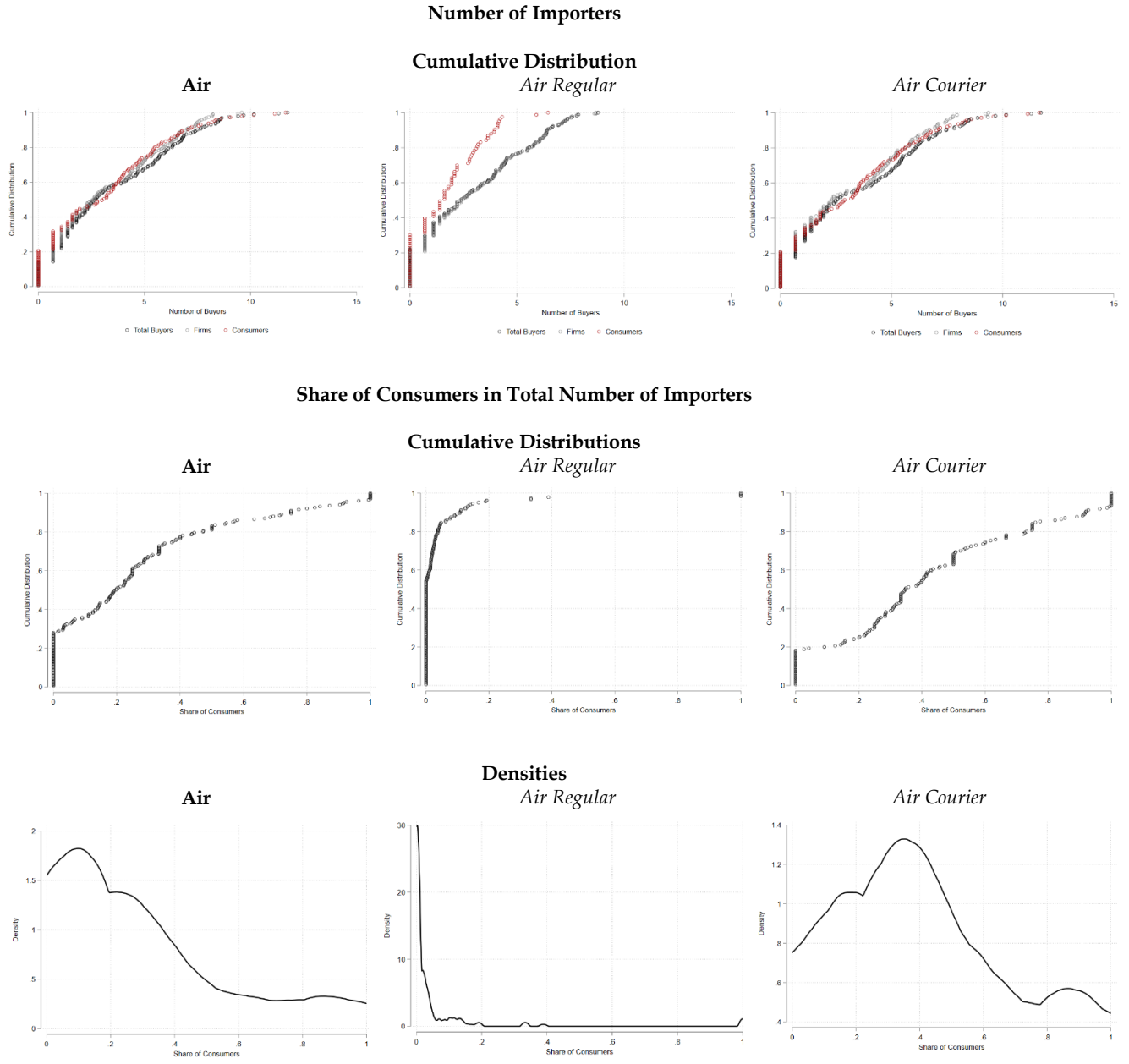
Table A2
The Gravity of Firms' and Consumers' Trade: The Share of Consumers

	Air		
	All	<i>Regular</i>	<i>Courier</i>
Distance	-0.072 (0.044)	-0.012 (0.036)	-0.044 (0.045)
GDP	-0.122 (0.083)	-0.003 (0.042)	-0.149* (0.081)
Contiguity	0.080 (0.085)	-0.014 (0.044)	0.101 (0.088)
Common Language	0.043*** (0.008)	0.009*** (0.003)	0.052*** (0.008)
PTA	-0.005 (0.048)	-0.045** (0.021)	-0.006 (0.051)
Observations	186	186	186

Source: Authors' calculations based on data from Peru's national tax and customs agency SUNAT.

The table presents OLS estimates of a variant of Equation (1) at the origin country level whereby the dependent variable is the share of consumers in the total number of importers for air imports (all, regular, and courier) using data from Peru in 2019. Standard errors are corrected for heteroscedasticity.

Figure A1
Cumulative Distributions of the Number of Importers across Origins, by Mode and Type of Importers,
and Cumulative Distributions and Densities of the Share of Consumers across Origins, by Mode



Source: Authors' calculations based on data from Peru's national tax and customs agency SUNAT. The figure presents cumulative distributions of the (the natural logarithm of the) of the number of importers per origin country (top panel) and cumulative distributions and kernel density estimates of the share of consumers in the total number of importers (bottom panel), for air imports (all, regular, and courier) and type of importer in Peru in 2019.