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Can Online Markets Make Trade More Inclusive?*

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Abstract

Technology made available by online markets has significantly reduced the cost of entry into international markets for small and medium sized firms, who can now reach far away consumers and create global reputation as a seller at very low costs. Empirical evidence using data from eBay sellers shows that a large share of online firms exports, even though they are on average much smaller than traditional offline firms. We show that in a world where income inequality is driven by an uneven distribution of capital rents, online markets help to reduce income inequality by providing smaller firms access to international markets.
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1 Introduction

Since the 1960s and until the beginning of the 21st century, global inequality has been rising as globalization deepened. As argued by Bourguignon (2012, 2013), this trend was mainly driven by rising inequality within and between countries (see Figure 1). In the new century, global inequality started declining mainly due to reductions in between-country inequality as emerging countries' average growth rates grew faster than in rich countries. But the contribution of within-country inequality to global inequality remains positive in the new century.[1]

Concerns over rising inequality have long been based on the idea of social justice, or the sustainability of economically efficient policies even if they promote inequality. However, economists have more recently recognized that too much inequality can be inefficient per se and hurt growth (Bourguignon, 2013). For example, lack of collateral due to an unequal distribution of income can leave many potentially profitable projects without access to funding. Thus, a better understanding of the determinants of inequality and the role played by international trade and globalization more generally is also important from an economic efficiency point of view.

The evidence on trade and inequality is growing (Goldberg and Pavnick, 2007 and Winters et al., 2004). The early empirical literature focused on Stolper-Samuelson type effects in a Heckscher-Ohlin world. This could explain increases in the observed wage inequality between skilled and unskilled workers in the North as their trade with less skill-abundant countries increases. But the setup was difficult to reconcile with increases in inequality in the South until Feenstra and Hanson (1996) showed that in a Heckscher-Ohlin world with a continuum of goods both the North and the South could experience increases in wage inequality as trade costs decline. Their idea was simple. As trade costs are reduced in the North, the less skill-intensive sectors of the North move to the South. These sectors become the most skill-intensive sectors in the South, which is initially specialized in the less skill-intensive sectors. Thus as trade costs decline, the relative demand for skilled workers increases in both the

[1] There are some noticeable exceptions to the continuous increase in within-country inequality. In Latin America, Chile, Brazil, Mexico and more recently Uruguay are examples of countries where sharp reductions in inequality were observed over the last couple of decades (Bourguignon, 2012).

North and the South, which matches the increases in within-country inequality that we observed in the North and South as trade intensified.

These models however could not really explain the fact that the increases in income inequality seem to be driven by what's happening at the top of the income distribution. It is not only the bottom of the distribution but also the middle of the distribution that is being left behind. As shown by Alvaredo et al. (2013), the share of income going to the top 1 percent in the United States has more than doubled between the early 1970s and has reached 25 percent of total income today. Rapid increases of the top 1 percent have been observed in many other developed countries. Models of outsourcing of tasks, such as Grossman and Rossi-Hansberg (2012), can help to explain this. Indeed, as firms outsource some services such as accounting, customs services, IT and call centers to firms located in the South, workers in the middle of the distribution in the North are subject to direct competition from workers in the South and may not be benefitting as much as those at the top of the distribution from the larger integrated markets.

The new trade models with heterogeneous firm also tend to show that trade may lead to increases in income inequality (Harrison, McLaren and McMillan, 2011). Trade tends to force the smallest firms out of the market and only the sufficiently large and more productive firms benefit from access to world markets. In the US, only the top 4 percent of firms benefit directly from export markets. Several papers have linked this kind of models to labor market imperfections or worker heterogeneity to show that income inequality increases as a result of trade. Egger and Kreickemeier (2009) use a model of rent-sharing based on fair wages. Davis and Harrigan (2010) use a model of efficiency wages. Helpman et al. (2010a) use a model of search-and-matching labor market frictions. All these models tend to show that increases in inequality are possible at least within low and moderate levels of globalization. Helpman et al. (2012) use employer-employee data for Brazil to show that much of overall wage inequality arises within sector-occupations and for workers with similar observable characteristics.

In this paper, we provide a link between the appearance of online trade and inequality. Our hypothesis is that large fixed entry costs into export markets may ex-

plain why so far only a few very productive large firms benefit from access to a larger global market, whereas many less productive and smaller firms are limited to smaller domestic markets. The technology supplied by online markets such as eBay significantly reduces these fixed entry costs into foreign markets and thus helps firms to reach far away consumers at relatively low costs. In a world where income inequality is driven by the distribution of capital rents among heterogeneous firms with more or less productivity, we show that the reduction in fixed costs brought upon by online markets will lead to a reduction in income inequality as a larger share of small firms benefits from having access to international markets.

We also show indirect evidence that this is happening based on Lendle, Olarreaga, Schropp and Vézina (2016) and on some new evidence for developing country firms' use of the eBay platform. Lendle et al. (2013) show that the fixed costs of exporting are much lower online than offline and because of that, almost all United States firms on eBay export, and these exporting firms tend to be much smaller than traditional offline exporting firms. Finally, we provide evidence on the share of exporting firms on eBay in some developing countries. Besides this empirical evidence, there is also plenty of more anecdotal evidence of small entrepreneurs, including those in developing countries, that successfully used online platforms to sell globally. By doing so, they are likely to bring down income inequality in their home markets. Such anecdotal evidence can be found in reports issued by eBay (see for example eBay (2013)).

Thus, online markets, by offering smaller firms the opportunity to benefit from the larger global market rather than being restricted to the domestic market, have the potential of making globalization more inclusive and therefore also politically more acceptable. There is little doubt that globalization brings numerous gains to society. It is by addressing its shortcoming and ensuring that gains are more uniformly spread across small and large firms, and rich and poor households that one can ensure that globalization and its gains are here to last and reach all parts of society.

The remainder of the paper is organized as follows. Section 2 provides a simple theoretical setup based on Baldwin's (2005) adaptation of Melitz' (2003) heterogeneous firm model to show that, as online markets reduce the fixed cost of exporting,

income inequality declines. Section 3 provides cross-country and firm-level evidence from online markets that is consistent with an important decline of the fixed costs associated with exporting. Section 4 provides some policy recommendations and concluding remarks.

2 Theoretical predictions

We follow Baldwin's (2006) adaptation of Melitz (2003) to show that reductions in the fixed cost of exporting provided by online markets can help reduce income inequality. Contrary to Egger and Kreickemeier (2009), Davis and Harrigan (2011), Helpman et al. (2010b) and Helpman et al. (2012), our approach does not rely on labor market imperfections. In our setup, there is no role at all for wage inequality, and we have a perfectly boring and functioning labor market. All income inequality is driven by changes in the distribution of capital income. This allows us to better match the observation by Bourguignon (2013) that the share of capital has been steadily growing over the last three decades in most OECD countries.

Following Baldwin (2006), on the demand side we have CES preference over a continuum of goods indexed by i:

$$U = \int_i \left(c_i^{1-1/\sigma} di \right)^{\frac{1}{1-1/\sigma}}, \quad \sigma > 1 \tag{1}$$

The demand function for good i is then given by:

$$c_i = p_i^{-\sigma} \frac{E}{P^{1-\sigma}}, \quad \text{where} \quad P = \left(\int_i p_i^{1-\sigma} di \right)^{\frac{1}{1-\sigma}} \tag{2}$$

On the supply side there are heterogeneous firms with marginal costs drawn from a Pareto distribution with a cumulative distribution function given by

$$G(a) = \left(\frac{a_i}{a_0} \right)^k$$

where a_i is the marginal cost of firm i and a_0 is the maximum support of the Pareto distribution.

Every individual in the economy is endowed with a unit of knowledge capital and in order to make a productivity draw from the Pareto distribution, he needs to pay a fixed cost (say, for a blueprint). If the productivity is sufficiently high, he pays the fixed cost of entry into the domestic market, labelled F_D and sells in the domestic market. If the productivity he draws is sufficiently larger, then he can pay the fixed cost of exporting F_X. Thus, only firms with sufficiently low marginal costs will enter the domestic market and only a fraction of them will also enter the export market.

Markets are monopolistically competitive, and the first order condition for profit maximization by each firm is given by:

$$p_i \left(1 - \frac{1}{\sigma}\right) = a_i \tag{3}$$

Operating profits are given by:

$$\pi_i = \left(\frac{p_i}{P}\right)^{1-\sigma} \frac{E}{\sigma} \tag{4}$$

The marginal cost cutoffs for domestic and export market firm entry solves to:

$$\pi_i = F_D \quad \text{and} \quad \pi_i = F_X \tag{5}$$

Substituting the first order condition of profit maximization into the price index, solving the integral and then substituting p_i and P into π_i and finally solving for the marginal cost cutoffs a_D and a_X yields:

$$a_D = a_0 \left(\frac{(\beta - 1) F_I}{(1 + \Omega) F_D}\right)^{\frac{1}{k}} \qquad a_X = a_0 \left(\frac{\Omega (\beta - 1) F_I}{(1 + \Omega) F_X}\right)^{\frac{1}{k}} \tag{6}$$

where $\beta \equiv k/(\sigma - 1) > 1$, and $\Omega = (F_X/F_D)^{1-\beta}$

$$\frac{a_X}{a_D} = \left(\frac{F_D}{F_X}\right)^{\frac{1}{\sigma - 1}} \tag{7}$$

The probability that a firm exports conditionally on selling in the domestic market

is given by:

$$\rho_i = \frac{G\left(a_X\right)}{G\left(a_D\right)} = \frac{\left(\frac{a_X}{a_0}\right)^k}{\left(\frac{a_D}{a_0}\right)^k} = \left(\frac{a_X}{a_D}\right)^k = \left(\frac{F_D}{F_X}\right)^{\frac{k}{\sigma-1}} \tag{8}$$

If $F_D = F_X$, then $a_X = a_D$ and all firms export, and

$$\frac{\partial \rho_i}{\partial \frac{F_D}{FX}} = \frac{k}{\sigma - 1}\left(\frac{F_D}{F_X}\right)^{\frac{k-\sigma+1}{\sigma-1}} > 0 \tag{9}$$

An increase in F_D/F_X towards 1 (i.e., a reduction in their differences due to reductions in information asymmetries, which could be provided by online markets) leads to a higher probability of exporting, and the impact is stronger when σ is low (more differentiated products) and k is high (very skewed distribution of marginal costs). Note that online markets will affect both F_D and F_X. The assumption we make is that online markets are likely to have a stronger impact on F_X as information gaps are larger when doing business abroad, which will lead to a proportionally larger fall in F_X.

Labor markets are perfectly functioning, workers are homogenous and we have an identical two country world. Wages can therefore be used as numéraire and they are not a source of income inequality, which will be due to the variance of rents accruing to knowledge capital in each of these sectors. Every individual is endowed with a unit of knowledge capital, which allows him to make a productivity draw. The individual income is:

$$y_i = w + r(a_i) = 1 + r(a_i) \tag{10}$$

All the inequality in y_i therefore comes from the distribution of knowledge capital rents r and therefore the distribution of marginal cost a_i.

With online trade and the resulting reduction of fixed cost of exporting (F_X) to the level of domestic fixed costs (F_D), two things happen. First, firms which were previously only selling in the domestic market can now export. This tends to reduce inequality because when all firms are exporting, then there are no more differences between the two types of firms. They all have access to the larger world markets. Second, the marginal cost cutoff for staying in the (domestic) market changes. We

know from (6) that $a_D = a_0 \left(\frac{(\beta-1)F_I}{\left(1+(F_D/F_X)^{\beta-1}\right)F_D} \right)^{\frac{1}{k}}$. Thus as F_X moves towards F_D from above, we have that a_D becomes smaller. Only more productive firms will stay because of the increase in competition. In principle, this second effect could increase or reduce inequality. If the distribution of firms' marginal costs was uniform, inequality will clearly be reduced as we will be cutting firms at one end of the distribution. However, with a skewed Pareto distribution, this is not necessarily the case because as we cut firms at the top of the marginal cost distribution we may well increase inequality. To see this, take the limit case where all exiting firms have the same marginal cost, but have a large mass. Their presence in the prior distribution led to a reduction in dispersion. Once these firms are not considered anymore, inequality can increase even if these firms were at one end of the distribution.

To see what happens with income inequality we will therefore take a look at the change of the degree of dispersion of marginal costs of firms before and after the fixed cost of exporting F_X becomes equal to F_D. As a measure of income inequality, we will use the coefficient of variation. There are two reasons for this. First the coefficient of variation satisfies all the desirable properties of an inequality index.[2] But more pragmatically, we can easily obtain explicit solutions for the variance and mean of a Pareto distribution with values of $k > 1$.[3] This is not the case for the Gini coefficient, and therefore it would require simulations or data to be able to answer the question of the impact of online trade on income inequality.

For values of $k > 1$ the mean of a Pareto with a maximum support a_D is given by:

$$\mu = \frac{k}{k-1} a_D \tag{11}$$

The variance of a Pareto with a maximum support a_D is given by:

$$v = \frac{k}{(k-1)(k-2)} a_D^2 \tag{12}$$

Thus the coefficient of variation of marginal costs is given by:

[2] It satisfies the properties of anonymity, population invariance, scale invariance, and the Pigou-Dalton transfer principle.

[3] The coefficient of variation is the ratio of the variance to the mean.

$$cv \equiv \frac{v}{\mu} = \frac{a_D}{(k-2)} \tag{13}$$

Substituting (6) into (13) we have that the coefficient of variation of marginal costs before the introduction of online trade (i.e., when $F_X > F_D$ is given by:

$$cv^{\text{off}} = \frac{1}{k-2} a_0 \left(\frac{(\beta-1) F_I}{\left(1 + \left(\frac{F_D}{F_X}\right)^{\beta-1}\right) F_D} \right)^{\frac{1}{k}} \tag{14}$$

The coefficient of variation of marginal costs after the introduction of online trade (i.e., when $F_X = F_D$) is given by:

$$cv^{\text{on}} = \frac{1}{k-2} a_0 \left(\frac{(\beta-1) F_I}{2F_D} \right)^{\frac{1}{k}} \tag{15}$$

After calculating the coefficients of variation before and after the introduction of online trade we compute the ratio of the former over the latter. If the ratio is smaller than 1, then income inequality increases with the introduction of online trade, whereas if the ratio is larger than 1, income inequality decreases with the introduction of online trade. It can be shown that the ratio is indeed larger than 1:

$$\frac{cv^{\text{off}}}{cv^{\text{on}}} = \left(\frac{2}{1 + \left(\frac{F_D}{F_X}\right)^{\beta-1}} \right)^{\frac{1}{k}} > 1 \tag{16}$$

To see this, note that that by assumption $F_X > F_D$ and $\beta > 1$. Then it is clear from (16) that the right-hand-side is larger than 1, and therefore $cv^{\text{off}} > cv^{\text{on}}$. Thus, there is a more unequal distribution of marginal costs before online trade is introduced. Combining this with the fact that when $F_X = F_D$ all active firms have access to the foreign markets, we necessarily have a more equal distribution of capital rents after the introduction of online trade.

Interestingly, the decline in income inequality is larger, the larger is F_X, i.e., the smaller is F_D/F_X. Therefore, countries facing the largest fixed costs of exporting are likely to be the ones that benefit the most from the reductions in income inequality after the introduction of online trade. And this effect will be more important the larger

is $\beta = k/(\sigma - 1)$. In other words, the more differentiated are the products (lower σ), the more the initial difference between F_X and F_D matters for the difference in inequality before and after the introduction of online trade. Similarly, the larger is k and therefore the more unequal is the distribution of marginal costs, the larger will be the decline in income inequality as F_X approaches F_D.

3 Online versus offline trade costs

In this section we explore the differences in online and offline trade costs using country and firm level data. As we will show, there is indeed evidence that online markets can reduce information frictions and fixed costs to export.

In online markets, the need to search for clients or to establish a distribution channel is much smaller than in offline markets. Also, costs of meeting market-specific standards and regulations fall at least partly on the consumer, who needs to ensure that the product will be accepted by customs authorities. Therefore, selling items to customers in an additional country are likely negligible. The cost for the seller of finding the right customer is also negligible. Finally, establishing a reputation as a seller who is worth trusting is much cheaper thanks to the reputation building mechanisms embedded in most online markets, such as eBay's powerseller or top-rated seller mechanism. Prospective customers can observe how many transactions a seller has already made and they can view ratings made by previous customers. Unreliable or fraudulent sellers are therefore more easily to detect. These mechanisms compensate for the disadvantages that customers face when they do online transactions, and in particular cross-border transactions. For example, taking legal action against a seller is often not practicable, but due to reputation mechanism, customers are willing to make one-off transactions with distant sellers against whom they could not take any practically feasible legal challenges.

We first summarize the evidence provided by Lendle et al. (2016) regarding online and offline trade costs at the country level using eBay as the online marketplace. We then turn to firm level evidence and start summarizing the evidence on distribution of sales across eBay firms. We then provide some evidence using firm-level data for

eBay sellers that indicates that eBay sellers face almost no fixed costs to export or to reach particular export markets.

3.1 Cross-country evidence

The data that we use in Lendle et al. (2016) covers all eBay trade flows between 61 developing and developed countries over the period 2004-2007, which represent more than 90 percent of world trade. The dataset covers all large developing countries, who all trade a fair bit on eBay (unlike very small and very poor countries, who are likely not to trade heavily across online platforms, at least not yet). The data covers eBay trade independent of the eBay site used. For example, a seller in India might sell to a buyer in Brazil through the US eBay site (eBay.com). Therefore, buyers and sellers can trade even if their respective countries do not have their own eBay site. The dataset allows us to focus on the same goods traded online and offline. To do so, we classify all eBay transactions into 40 product categories that are matched with product codes at the 6-digit level of the HS classification using information on sub-categories from the eBay website (a small number of product categories that are unlikely to be tradable across borders, such as real estate or vehicles, have been excluded). To improve the matching between online and offline flows, we only look at eBay exports by businesses, and we ignore all imports purchased via auctions, which are prevalent on eBay but quite uncommon offline.

To compare differences in the impact of trade costs in online and offline trade flows, we estimate a gravity equation for online and offline flows separately:

$$\begin{aligned} \ln(m_{ij}) = \quad & \ln(y_i) + \ln(y_j) - \ln(y_w) + \beta_D \ln(D_{ij}) + \beta_{NB} NB_{ij} + \\ & \beta_{NC} NC_{ij} + \beta_{NCL} NCL_{ij} + \beta_{NCLS} NCLS_{ij} + \\ & \beta_{NFTA} NFTA_{ij} + \beta_i + \beta_j + \mu_{ij} \end{aligned} \tag{17}$$

where m_{ij} are bilateral imports of country i from country j. D_{ij} is the geographic distance between countries i and j, NB_{ij} is a dummy variable taking the value 1 when countries i and j do not share a border, NC_{ij} is a dummy variable taking the value 1 when countries i and j did not share a colonial link, NCL_{ij} is a dummy variable

taking the value 1 when countries i and j do not share a common language, $NCLS_{ij}$ is a dummy variable taking the value 1 when countries i and j do not share a common legal system, and $NFTA_{ij}$ is a dummy variable taking the value 1 when countries i and j are not part of the same Free Trade Agreement.[4] All βs are parameters to be estimated, β_i is an importer fixed effect and β_j is an exporter fixed effect. These importer and exporter fixed effects correct partly for the price indices or multilateral resistance terms, but also for self-selection into online and offline markets as we make them specific to the type of flows (online of offline).

Equation (17) is estimated linearly, but also using a Poisson estimator. We estimate an equation for online flows and a separate equation for offline flows, but we also append both types of flows with an interaction variable for online flows so that we can test for statistical differences in the trade costs coefficients. Table 1 provides the results of the estimation of (17) using distance as the only trade costs in columns (1) and (4). The elasticity of distance is 65% smaller online than offline. In columns (2) and (5) of Table 1 we provide the estimates of (17) including the other usual trade costs variables. When we introduce these additional trade costs, the coefficient on distance declines both online and offline. Still it remains around 65% smaller online, suggesting a flatter world on the eBay platform. This result is robust and holds for various other specifications (see Lendle et al. (2016)).

Some interesting patterns emerge regarding the other trade-cost variables. It is not only distance that matters much more offline, but also having a common legal systems, trade agreements, colonial links and common borders. We test for the statistical significance of these differences by appending the online and offline datasets and estimating the gravity equation including interactions of each trade costs with an eBay dummy that takes the value of one if the flow on the left-hand side is the eBay flow and zero if it is the offline flow. As seen in Table 2, we find that the difference in the effect of distance is statistically significant. What's more, we find that the absence of colonial links and common legal systems also matter significantly less online. One

[4]Note that we measure the absence of common language, common legal system, colonial links or trade agreements, rather than their presence as in most of the literature. This has no consequences for the estimates, but it allows us to interpret these variables as trade costs (like distance) rather than as trade-enhancing variables.

possible explanation for this is that offline trade flows are very persistent over time and still follow historical links, such as colonial links, even if such links do not necessarily directly facilitate current trade. New online trade, which results from an entirely new match of buyers and sellers, is not driven anymore by such historical links, or at least less so. We find no significant difference in the effect of free-trade agreements, borders, or language. We have found stronger effects of language for online trade and smaller effects for free-trade agreements in other specifications, which is what one would expect. Online trade makes it crucial that buyers and sellers have some common knowledge of a language because they might have to interact directly, whereas offline trade is mostly done by larger companies and with the support of intermediates. For free-trade agreements, one should expect a smaller trade-increasing effect for online trade because small shipments - of which online trade mostly consists - are less likely to actually benefit in a meaningful way from tariff reductions, be it because no import duties are applied anyway on small shipments, or because fulfilling requirements for preferential rates is overly complicated or disproportionally expensive for small shipments, and those trade barriers are not usually addressed by today's free-trade agreements.

Interestingly, shipping costs on eBay do not have any significant effect on trade flows. However, this result should be carefully interpreted. Our data shows that average shipping costs on eBay - in ad valorem terms - are actually very high (above 10%). But shipping costs vary little with distance because shipments are mostly made through postal systems, where cost differences among international destinations are often relatively small. The level of shipping costs for online trade is inevitably high because there is less scope for bulk shipping, and this is likely one of the main impediments for online trade that affects the overall level of online trade, though not as much the distribution of online trade across countries.

Columns (3) and (6) of Table 1 provide the results using the Poisson pseudo-maximum likelihood estimator which was suggested for gravity models by Santos Silva and Tenreyro (2006) to control for zero trade flows in the double log specification of the gravity equation and heteroscedasticity. Again we find that distance matters

more offline. The estimated distance elasticity is around 45% smaller online.[5]

These findings demonstrate how new technologies can help firms to overcome geographic distance and other trade barriers, and it is plausible to believe that small or medium-sized firms and entrepreneurs are gaining disproportionately more from such technologies because large firms are likely to be less constrained by these barriers. The following section provides direct evidence for this, but even aggregated data that we used for our gravity model already points into that direction because eBay trade is conducted by relatively small firms, whereas offline trade is dominated by large companies.

3.2 Firm level evidence: Distribution of sales online and offline

In Lendle et al. (2013), we use the sample of all US-based eBay sellers and explore how different is the size distribution of firms online and offline. It can be shown that the distribution of sales across online sellers does not follow a Zipf law, contrary to what is observed across traditional offline firms. Figure 2 shows the distribution of exports among US eBay firms. Interestingly, the largest deviations from Zipf law are found for mid-size eBay exporters, which tend to have a larger share of exports than what would have been predicted by Zipf's law. Small and large firms have a smaller share of sales than predicted. This suggests that is the mid-sized firms that are benefiting most from smaller trade costs online. The right panel of Figure 3 confirms this as it shows that the share of total exports in the hand of the top 10 percent of exporters is much smaller online than offline and medium-sized firms have a larger share in total exports.

The share of the largest 5 percent of firms in overall exports is much smaller online than offline in those developing countries for which we have both online and offline data - the same finding we made for the US. As can be seen from Figure 4, in Chile and Peru the top 5 percent of exporters represent more than 90 percent of total sales offline (data is not available for all countries). Online, the equivalent numbers are slightly above 30 percent. Again, this suggest that sales are more evenly distributed

[5]Note that the number of observations in the poisson regressions is equal to the number of observations in the log-linear regressions because we have added 1 to all observations in the latter.

online, and therefore the gains from trade are also more likely to be more evenly distributed, rather than concentrated among a small number of “exporter superstars”.

What explains the more equal distribution of sales for online firms? It could be a temporary phenomenon because the online market is fairly new, and there may not have been sufficient time for “exporter superstars” to develop. We are also looking only at a subselection of e-commerce, with sales of giants such as amazon.com not being part of the analysis. But some characteristics of online markets also likely limit concentration. Economies of scale are likely more limited and entry barriers are low, making online markets such as those that we observe on the eBay platform less likely to be dominated by just a few sellers.

3.3 Firm level evidence: E-Commerce, fixed costs to export and market entry costs

Firm level eBay data confirms that online firms face much lower fixed costs of exporting and also lower entry costs into foreign markets.

In Lendle et al. (2013), we compare the probability of exporting and the number of markets to which a firm exports between eBay and offline firms. The first surprising result is that 85 percent of US firms on eBay export. An eBay seller is considered an exporter if at least one transaction is made with a foreign customer (note that we do not take into account over which eBay site the transaction occurs - what matters is only whether seller and buyer are based in different countries). In contrast, the corresponding number offline - taken from the traditional firm-level literature - is around 4 percent for the US. Moreover, as shown in Table 3, there are no big differences across sectors. For all product categories, a vast majority of US firms on eBay are selling abroad. These high shares of firms exporting also exist across a wide range of other developed and developing countries.

Figure 5 shows the share of exporting firms and exporting eBay sellers based in different developing countries. With the exception of India, all the other countries show a very large share of online firms exporting, and this is true even if we include small commercial sellers in the datasets (here, small commercial sellers are defined

as those with annual sales below USD 1,000). In Chile and Peru, which are the two Latin American countries in the sample, the share of exporters is very close to 100 percent. In contrast, only a relatively small share of offline firms in these markets export (with the exception of Thailand). Note that the presence of a local eBay site plays some role here. In India, where a local eBay site exists, domestic eBay trade becomes more important, even though domestic trade can and does take place also in countries with no own eBay site.

Empirical evidence from eBay exporters also suggests that they face practically no country-specific fixed costs to enter particular markets, as demonstrated by the fact that the average eBay exporter serves a large number of different foreign markets. For the same sample of eight developing countries, it can be shown that average commercial eBay sellers (with a threshold of annual sales of USD 10,000) reach 30-40 different countries (see eBay (2013)). Similar figures can be found for developed countries. Data that is now available for a wide range of countries through the World Bank's "Exporter Dynamics Database" shows that the average offline exporter reaches only around 3-5 different foreign markets. For the US, the average can be derived from Armenter and Koren (2010) is around 3.5.

In Lendle and Vézina (2015), we provide a detailed analysis of this pattern based on even more detailed transaction-level eBay data. One important factor to be taken into account when interpreting the number of markets reached by a firm is the number of transactions. Many exporters, online and offline, only have a small number of export transactions in a single year, which by definition is an upper bound for the number of markets they reach. But even for comparable numbers of export transactions, we find that sellers on eBay reach many more markets than their offline counterparts. For example, US-based eBay sellers with 100 export transactions reach on average 21 different markets. To calculate such indicators for offline firms requires transaction-level data, which is hard to come by. Using more detailed export data for Peru, which is available through the World Bank, we can show that traditional Peruvian exporters with around 100 export transactions reach only 4-6 different foreign markets. We then compare these figures with the number of destinations that exporters should reach if their exports were randomly allocated across export destinations, taking into account

the different sizes of export destinations. In such a "balls-and-bins model", as suggested by Armenter and Koren (2010), exporters with 100 transactions are expected to reach 29 different markets.[6] On eBay, sellers based in Peru with 100 export transactions reach around 20 different markets, which is pretty close to what one would expect if exports were purely random. Thus is illustrated in Figure 6. These results indicate that there are no, or at least much lower, fixed entry barriers into particular markets when using online platforms.

4 Policy recommendations and concluding remarks

Promoting the access to online markets by small and medium size firms can help connecting firms - including those in remote areas - not only to domestic customers, but also to international markets. It also makes it easier, cheaper and faster to build a reputation for small firms. By reducing the fixed cost faced by exporters in foreign markets, online platforms help to increase the share of firms that export and help them to reach a much larger number of foreign markets. Traditional trade costs or trade frictions seem to be much smaller online: the trade-reducing effect of distance between countries is 65% smaller online than offline.

As a result of this, a much larger share of online firms exports, compared to offline firms. In the US, for example, 85% of online firms export, compared to only 4% of offline firms. Similar findings can be made for developing countries. While the share of firms exporting offline varies across countries (mainly due to different types of data sources and the types of firms covered), it is always much lower than the share of online firms that is exporting, even though these new online firms tend to be much smaller than traditional firms and exporters. If a larger number of firms benefit from a larger demand in foreign markets, then this implies that smaller firms benefit from

[6] The basic idea behind Armenter and Koren's balls-and-bins model is that there is that trade consists of a finite number of individual transactions. If one observes that a particular firm only sells to 10 different markets, then this is not necessarily an indication for fixed entry costs into markets. A firm with, say, 30 export transactions, is highly unlikely to reach 30 different markets because there is a finite number of possible destinations (around 200) with demand allocated differently across countries due to different sizes. It obviously cannot reach more than 30 markets. Even in a world with no entry costs into markets, but with finite numbers of trade transactions, most firms would reach only a limited number of different markets.

international trade.

Online trade thus provides a channel through which inequality can decline. If the assumptions of our model hold, then the evidence provided on the reduced fixed costs to export and to enter individual foreign markets indicates that online trade could indeed reduce inequality. The fact that the actual distribution of exports among online sellers is more equal than among traditional exporters provides even more direct evidence that online trade can lower inequality.

To spread the benefits of online trade further, governments can take an active role. For example, many Export Promotion Agencies have as one of their main mandates to promote exports by SME firms (Lederman et al. 2010a), which makes sense because information asymmetries are likely larger for SMEs compared to large established exporters, which such agencies can help to reduce. Moreover, today's new firms represent 50% of the export bundle 10 years later (Eslava et al. (2008) in Colombia and Lederman et al. (2010b) in Costa Rica). Incorporating programs of access to online markets targeted towards SMEs may be an efficient way of helping SMEs to export. This can include, for example, programs that strengthen postal services, or that improve customs procedures for small exporters. In fact, several such programs already exist. A good example is the "Easy Export" scheme offered by national postal services in several Latin American countries, which allows for simplified export procedures for small shipments sent through the postal system and which is used successfully by commercial exporters. It is likely that many of them connect to their customers through online platforms.

A report by eBay (2013) highlights a wide range of other barriers to e-commerce in a number of developing countries and examples of how they can be overcome. For example, some countries impose very low "de minimis" threshold values for small shipments, above which complicated customs procedures apply, sometimes including fixed collection fees that can be very high compared to the value of the imported good. While this is primarily an issue relevant for the importing country, low thresholds in a developing country can also harm their own small-scale online exporters because return shipments are affected. While there is a legitimate concern that consumers should not be allowed to evade otherwise applicable taxes on imports by

ordering online, fees and “de minimis” thresholds need to be structured in a way that does not disproportionally affect small shipments.

Another example is legislation on trademarks and copyrights. Some countries allow for fairly liberal rules on imports of trademarked products, whereas others allow trademark owners to prevent imports of their trademarks through secondary markets (so-called grey imports), a system that limits competition and allows for price discrimination across countries. Barriers to cross-border payment services or non-harmonized consumer rights legislations are other examples. Needless to say, having affordable and high-quality access to the internet is probably the most important requirement for e-commerce to thrive.

While this paper has focused on the benefits of e-commerce for small exporters, quite obviously one of the main beneficiaries of e-commerce are consumers. Potential benefits for consumers (or for SMEs that purchase inputs for production) can be significant, in particular for small countries with limited numbers of local distributors and limited local competition. E-commerce can allow consumers in such countries to gain access to essentially the same basket of goods at prices similar to those paid by consumers in larger and more developed countries. This requires reliable internet connections, functioning and affordable international and domestic postal distribution networks and border procedures that do not disadvantage small shipments. Similarly, within a country, online trade can reduce inequality because it provides access to essentially the same range of products for consumers in isolated or remote communities as compared to urban consumers, provided, of course, that postal networks are well-functioning.

To conclude, new trade opportunities driven by e-commerce can disproportionally benefit small and medium-sized firms, who currently rarely participate directly in international markets. This allows the benefit of trade to spread more widely within countries, including to small entrepreneurs and their employees. Technology-driven online trade can therefore reduce income inequality and make trade more inclusive. But to fully realize these new gains from trade, governments and export promotion agencies need to address remaining barriers to e-commerce.

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Table 1
Gravity, online and offline

	(1) eBay	(2) eBay	(3) eBay	(4) offline	(5) offline	(6) offline
Distance	-0.508***	-0.351***	-0.369***	-1.408***	-1.134***	-0.663***
	(0.0337)	(0.0465)	(0.107)	(0.0367)	(0.0501)	(0.0456)
No common legal sys.		-0.241***	-0.254**		-0.572***	-0.379***
		(0.0592)	(0.103)		(0.0543)	(0.0591)
No colony		0.0624	-0.285**		-0.462***	0.0300
		(0.142)	(0.128)		(0.166)	(0.109)
No common language		-0.412***	-0.960***		-0.195*	0.218**
		(0.0946)	(0.141)		(0.110)	(0.0956)
No border		-0.137	-0.750***		-0.318**	-0.285***
		(0.132)	(0.143)		(0.151)	(0.0895)
No FTA		-0.193**	-0.295*		-0.318***	-0.430***
		(0.0880)	(0.174)		(0.0905)	(0.0830)
Observations	3,660	3,660	3660	3,660	3,660	3660
R-squared	0.895	0.896		0.882	0.889	

Note: The source is Lendle et al. (2016). Regressions are estimated using an importer and exporter fixed effect linear model, except for columns (3) and (6) which use a poisson pseudo maximum likelihood estimator. The figures in brackets are pair-clustered standard errors, and *, **, and *** stand for statistical significance at the 10, 5, and 1 percent level respectively.

Table 2
Testing differences in gravity coefficients

	Distance	No common legal system	No colony	No common language	No border	No FTA
Gravity coefficient	-1.134***	-0.572***	-0.462***	-0.195*	-0.318**	-0.318***
	(0.0501)	(0.0543)	(0.166)	(0.110)	(0.151)	(0.0905)
Interaction with eBay dummy	0.783***	0.332***	0.524**	-0.217	0.181	0.125
	(0.0662)	(0.0804)	(0.226)	(0.142)	(0.207)	(0.130)

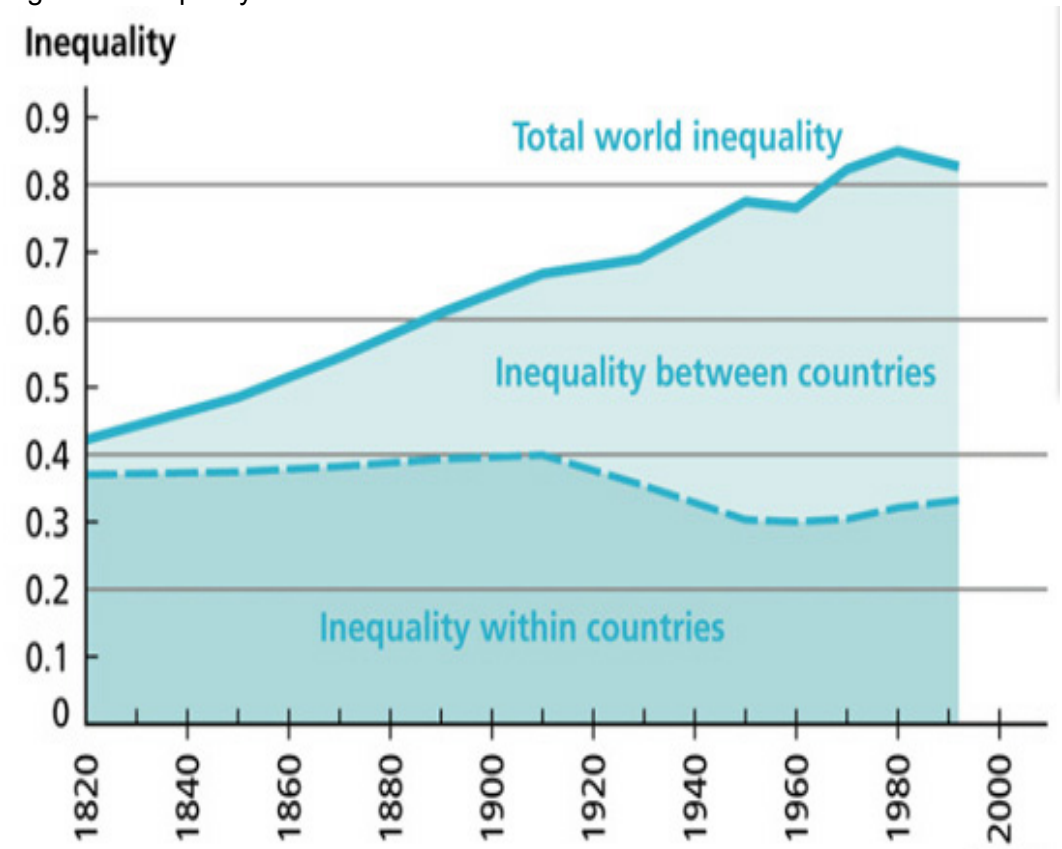
Note: The source is Lendle et al. (2016). The dependant variable is log imports. Regression estimated using importer-eBay and exporter-eBay fixed effect linear model. 7,320 Observations. R-squared: 0.908. The figures in brackets are pair-clustered standard errors, and *, **, and *** stand for statistical significance at the 10, 5, and 1 percent level respectively.

Table 3
eBay product categories

Description	SAP	Percent of firms	Percent of firms that export	Avg openness of exporters
Antiques	1	16	93	12
Baby	2	10	86	10
Books, Comics & Magazines	3	33	87	11
Business, Office & Industrial	4	20	91	11
Auto Parts	8	24	91	12
Clothes, Shoes & Accessories	9	52	86	12
Coins	10	11	87	11
Collectables	11	50	89	12
Computing	12	27	88	12
Consumer Electronics	13	22	90	12
Dolls, Doll Houses	14	18	91	11
Hobbies & Crafts	15	17	90	10
Home & Garden	16	21	89	10
Jewellery & Watches	17	27	91	12
DVDs, Film & TV	18	21	86	11
Music	19	14	91	14
Photography	21	21	91	12
Pottery & Glass	22	17	91	11
Sporting Goods	24	33	89	11
Sports Memorabilia	25	22	89	11
Stamps	26	3	95	15
Toys & Games	28	39	89	12
Musical Instruments	30	14	93	13
PC & Video Gaming	32	23	85	11
Art	35	8	95	13
Home Furnishing	36	32	88	10
Health & Beauty	37	24	88	11
Cell Phones and Accessories	40	27	88	12
Entertainment Memorabilia	42	11	95	14
Everything else	99	13	88	11

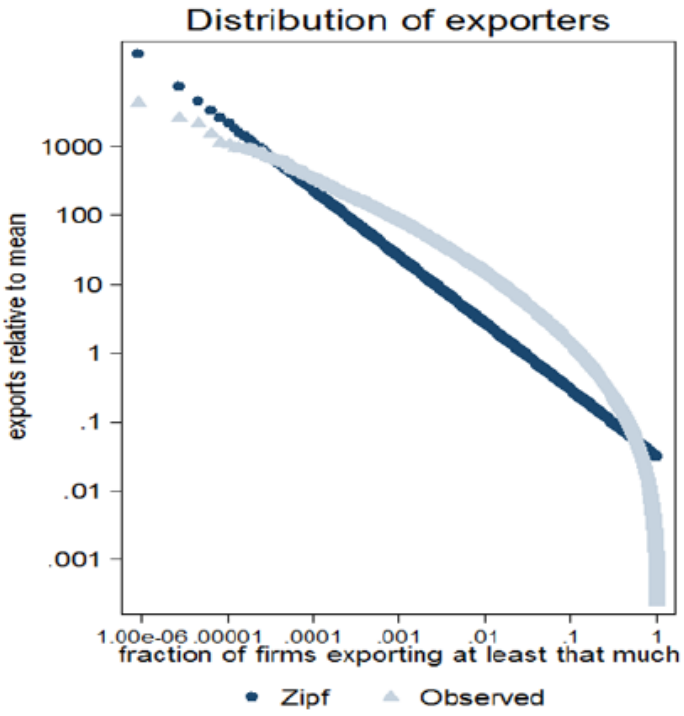
Note: Source: Lendle et al. (2013), based on data from US eBay sellers. “SAP” is the eBay category code. “Percent of firms” is among all firms. “Percent of firms that export” is among all firms within the SAP category. Exporter openness is the percent of exports over total sales.

Figure 1: Inequality within and between countries across time



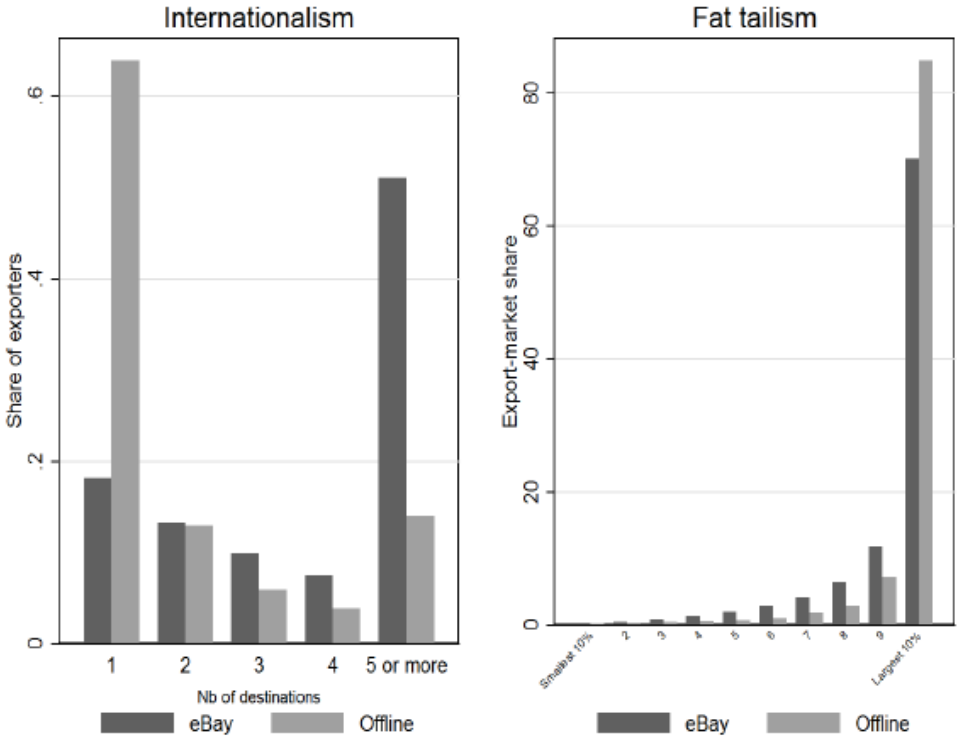
Source: Bourguignon and Morrisson (2002), Table 2. The chart shows a decomposition of world inequality, using as measure the mean logarithmic deviation.

Figure 2: Distribution of eBay exporting firms in the US: Zipf law?



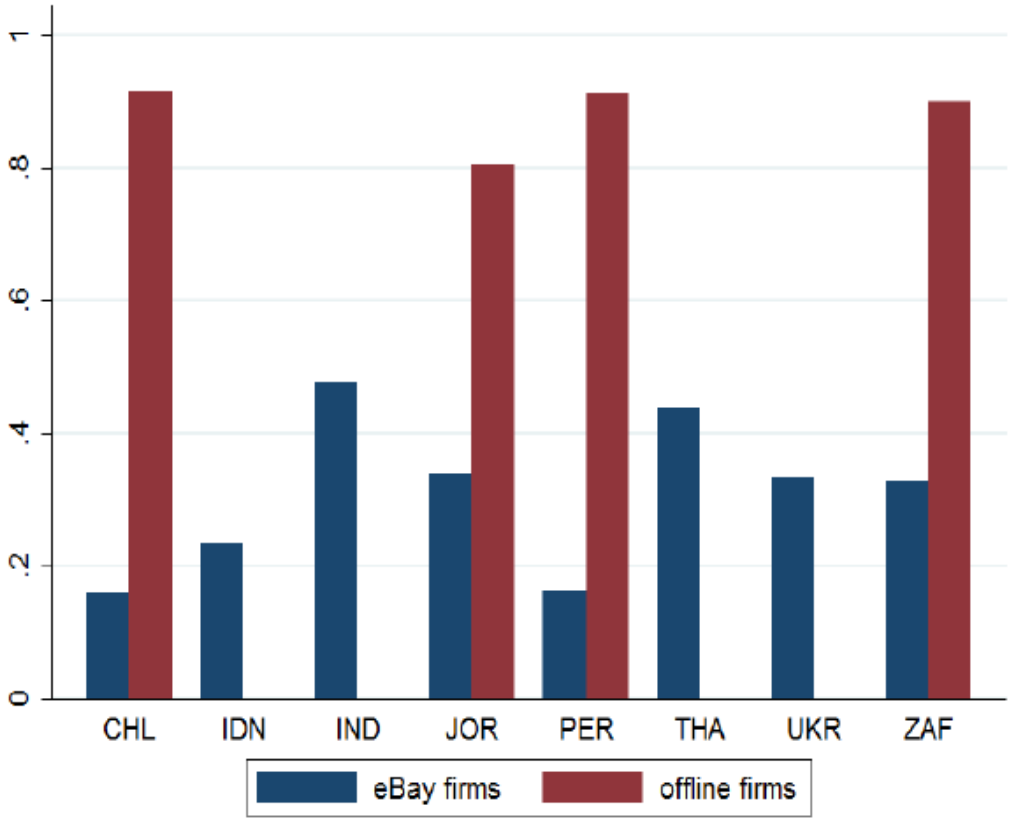
Source: Lendle et al. (2013).

Figure 3: US eBay firms are more international than offline firms



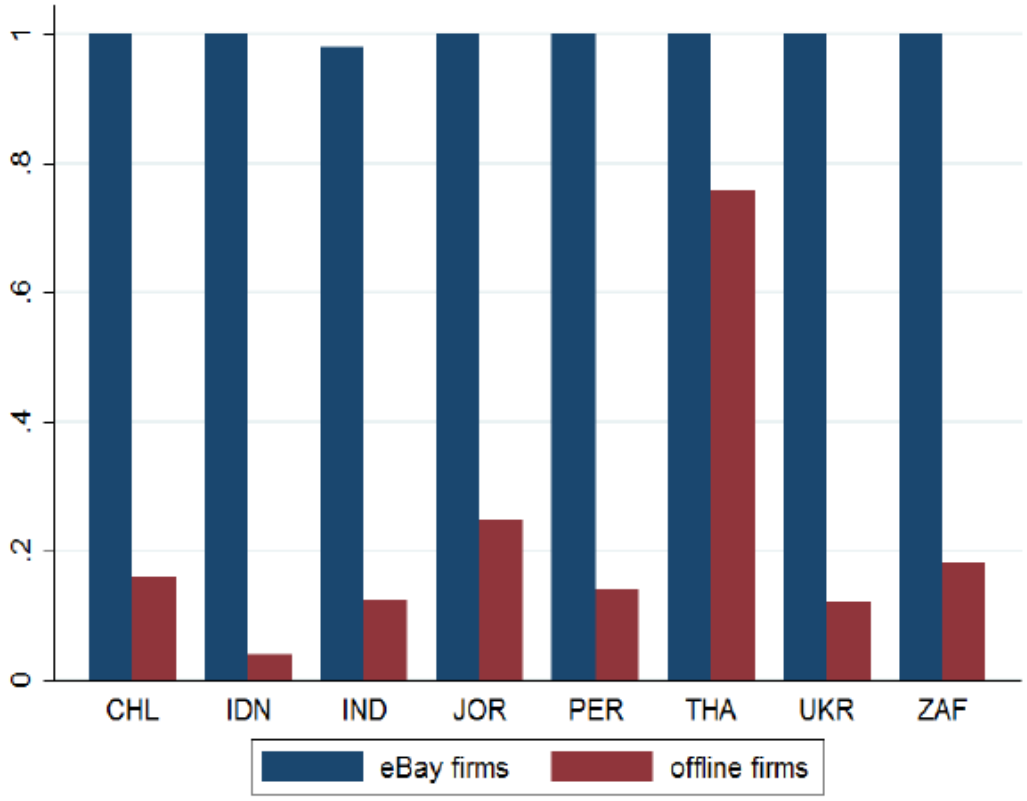
Source: Lendle et al. (2013).

Figure 4: Market share of largest 5 percent: eBay versus offline exporters



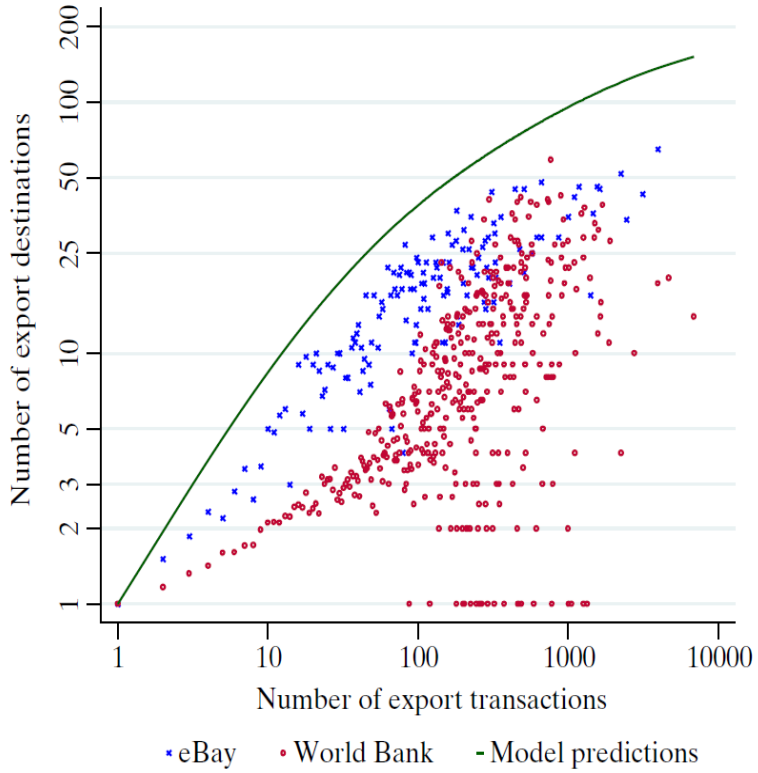
Source: World Bank Exporter Dynamics database and eBay, figure taken from Lendle et al. (2013). The chart shows market shares of the largest 5 percent of eBay firms among all eBay firms, and likewise for offline firms.

Figure 5: Share of firms exporting: eBay versus offline firms



Source: World Bank Enterprise Survey database and eBay, figure taken from Lendle et al. (2013)

Figure 6: Actual and expected number of export destinations for Peruvian exporters on eBay and traditional exporters



Source: Lendle and Vézina, 2015