Global Patterns in Exporter Entry and Exit

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Abstract: We explore entry, exit, and the survival of new exporters using firm-level international transaction data from fifteen countries. We find that (i) entry and exit rates of firms in 66 export industries are very similar across countries; (ii) the rates of entry, exit, and survival are highly correlated with the average industry transaction size; and (iii) the sensitivity of the entry rate to average transaction size is increasing in the country's cost of exporting. We show that a heterogeneous-firm model with uncertainty and sunk entry costs can explain these results. In particular, the results are consistent with either uncertainty or sunk costs differing across industries but being similar across countries. We exploit the potential for entrants to begin exporting with small trials in high-entry cost industries to distinguish between the two explanations, and find that sunk entry costs are the main factor.

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I. Introduction

A number of studies find rates of entry into exporting of 30-60 percent a year.[1] However, a related literature uncovers very high costs of entry into exporting. For example, Das, Roberts, and Tybout (2007) estimate entry costs in Colombia of around $400,000 for entrants into three distinct industries (leather, knitting and chemicals). Evidence of hysteresis in trade flows in response to large exchange rate shocks also supports the role of substantial sunk entry costs.[2] But, high rates of entry and exit and large entry costs seem contradictory. How can there be very high entry costs of exporting and yet entry and exit rates are also large?

We use cross-country firm-level export data to reconcile these facts. We find that there is significant variation in rates of entry, exit, and the survival of new firms between industries, which is very similar across countries. These results imply that there are global industrial characteristics that determine exporter participation. We show that much of this variation can be explained by entry costs, uncertainty, and the ability to test markets with small shipments.

Specifically, we use average transaction size by industry to proxy for entry costs. Industries where transactions tend to be small on average are likely to have low entry costs. We find that entry and exit rates are highest in sectors where average transactions are smallest. In contrast, the survival rates of entrants are highest in sectors with large average transactions, where presumably only the most productive firms can overcome entry costs. Small exports are only viable in specific sectors. For example, of the 66 SITC industries, turnover is highest in coins (SITC 96), where small exporters can easily participate; and turnover is lowest in fish (SITC 03) where standards must be met, exports must be kept frozen, and small exports are

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[1] See Alvarez and Lopez (2008) for Chile, Eaton, Eslava, Kugler and Tybout (2008) for Colombia, Volpe-Martincus and Carballo (2008) for Peru and Albornoz et. Al. (2010) for Argentina.
[2] See Baldwin (1988), Baldwin and Krugman (1989), and Dixit (1989).

unprofitable. Overall, entry and exit rates are highest in industries where small sales are possible. The results are robust to controlling for domestic entry and exit rates, global industrial conditions, and protection.

We also find that the sensitivity of entry rates to transaction size is increasing in a country's costs of entry into exporting. Specifically, controlling for industry- and country-fixed effects, we find that in countries with high costs of exporting (as measured by *Doing Business*) the sensitivity of entry to industry transaction size is larger. This implies that when trade costs are large, the ability to enter a foreign market with small transactions is relatively more important.

We develop a model with uncertainty about profitability and sunk entry costs and show how this explains the high correlation across countries in the industry-level entry, exit, and survival rates. The model generates entry and exit as form of trial and error. Specifically, firms first decide whether to enter the export sector, and then whether to continue exporting. Prior to entry, each exporter faces uncertainty about their cost of exporting a particular product, and once they export the cost is revealed. The uncertainty generates significant entry and exit –some firms with a negative expected value of entry will attempt to export, and if their cost draw is bad they will exit. The intuition is that there is a lifetime value of getting a good cost draw and only a one-period negative shock from a bad draw. This implies that the present value from attempting exports can be positive even if the one-period expected gain is negative. It also means that with sunk costs of entry, there can still be significant entry and exit.

We also show that if small trials are possible in high entry-cost industries, firms' strategies change. This allows us to empirically distinguish entry-cost variability from variation in uncertainty as explanations for the similarities in industrial entry rates across countries. Specifically, under the entry-cost explanation, small entrant transaction size relative to incumbent transaction size indicate the presence of high entry costs and thus the entry rate should be lower in sectors where such small starts are common. In contrast, for a given entry costs and variable uncertainty, more uncertainty expands the number of firms that attempt small export starts. In this case, the entry rate should be greater in sectors with more small starts. We find that variation in entry costs across industries explains much of the similarity of entry rates by industry across countries.

Several other recent papers focus on related issues. Segura-Cayuela and Vilarrubia (2008) and Eaton et al. (2008) incorporate uncertainty that is alleviated as firms learn about a market. In Eaton et al. the uncertainty is firm specific while in Segura-Cayuela and Vilarrubia uncertainty about a market is reduced as more firms enter. In these models entry is suboptimally slow, in contrast, in our model greater uncertainty leads to more entry and exit by firms. Like ours, the model of Albornoz et. Al. (2010) has uncertainty about the profitability of a particular market that is revealed when a producer enters a market. However, their focus is on the sequence of entry into new markets and not on entry and exit by firms into exporting. In a related paper (Freund and Pierola (2010)), we develop a similar model but focus on entry and exit into products and markets new to the country.

The results have important implications for the set of exporters observed. The main concern about sunk costs and uncertainty is that many potentially good exporters may not enter because of the risk of losing hefty entry costs. In industries with low entry costs or where small trials are feasible, this is not an issue, as exporters can obtain information about their export success without expending substantial sums. In fact, our results show that low entry costs and/or small trials are likely to serve the purpose of allowing the entry of the best firms into exporting in many industries.

These high observed entry rates are important for export growth. We find that after six years, in five countries with extended time series (since at least 2002), new firms represent on average nearly one quarter of the exports in the last year of our series (2009).[3] In contrast, Amurgo-Pacheco and Pierola (2008) find that new products and new destinations account for on average only about 14 percent of exports after a decade. A number of other studies also find that the extensive margin –new products and new markets- contributes relatively little to export growth (see Besedes and Prusa 2010). Thus, new exporters are an important driving force of export growth in developing countries, and are likely to be more important than new markets and new products.

The paper is organized as follows: the next section presents the data and some stylized facts. Section 3 develops the theoretical framework. Section 4 examines the data for consistency with the theory, and section 5 concludes.

II. Data and Stylized Facts about Exporters

We gather export transactions data from fifteen countries. In twelve cases (Albania, Bulgaria, Cambodia, Costa Rica, Dominican Republic, Kenya, Malawi, Mali, Mauritius, Peru, Senegal and Tanzania) the data have been collected directly from Customs Authorities, Ministries of

[3] Countries are Costa Rica, Dominican Republic, Mauritius, Peru, and Senegal.

Commerce or National Statistics Institutes, while in three others (Chile, Colombia and Ecuador) they have been purchased from private companies.[4]

As a consistency test, we compare the total values obtained from aggregating the data at the exporter level, with the total values obtained at the country level from Comtrade and drop the years in which the values obtained from customs at the exporter level represent less than 40 percent of the total value from Comtrade aggregates. As a result, we drop one year in the case of Malawi and the two first years in our sample for Ecuador.

We begin with some definitions. Except where otherwise indicated, an industry is at the two-digit SITC level (66 industries). *Number of firms* is the number of firms in a country or country-industry. *Average exports* are annual average exports at the firm level. The *Entry Rate* is calculated as the number of firms that export in t and are not present in t-1, relative to total firms in t. The *Exit Rate* is the number of firms that export in t-1, but not in t, relative to total firms in t-1. The *One-year Survival Rate* is the number of entrants in t that are still present in t+1 relative to total entrants in t. Note that *Exit Rate* incorporates exit of all firms (new and old), while the *Survival Rate* is a measure of the ability of *new* firms to continue exporting for more than one year.

Table 1 shows the averages of these variables by country. Data are annual averages from 2003 to 2008, and depend on availability by country. There is significant variation in the number and size of firms across countries. For example, Mali has very few firms with a large average size, while Bulgaria has a large number of firms, with a small average size. Entry and exit rates

[4] In this paper, we focus on the number of firms, size, entry, exit, and survival in the exporting activity overall. In related work, we use the same data and focus on diversification—patterns in the number of products and the number of destinations to which firms export.

show some variation, though most rates tend to lie between 35 and 45 percent. Entry and exit are highly correlated (0.91). Finally, one-year survival rates are on average 38 percent, implying most entrants exit after just one year. Survival is negatively correlated with entry (-0.71).

Table 2 shows similar statistics by one-digit SITC sector. As with countries, some sectors tend to have a small number of large firms (eg. fuel (3) and commodities and transactions not classified elsewhere (9)), while others tend to have many small firms (machinery and transport equipment (7) and miscellaneous manufactures (8)). Entry and exit rates are also highly correlated across sectors (0.99), while entry and survival are negatively correlated (-0.95).

From this point on, we use data at the two-digit SITC level by country. To compare industrial structure across countries, we compute country-pair correlations for each variable by industry (number of firms, total size, entry, exit and survival). For the 15 countries, there are 105 possible correlations ((15*15-15)/2). Table 3 reports the results on average correlation and its relative significance. The number of firms by industry is very similar across countries. All but two correlations are highly significant (at the 5% level) and the average correlation is 0.67. Entry and exit rates also look similar across countries—a large share of positive correlations with relatively high average correlations. Survival rates are reasonably similar, though somewhat less so than entry and exit rates. In contrast, the total size of the industry shows much less similarity. Only 24 percent of correlations are significant, and the average correlation is 0.17.

These results imply that conditions are such that the relative number of exporting firms across industries tends to be very similar between countries. Over time this can be explained by similar entry, exit, and survival rates. Models with entry costs and uncertainty that vary at the industry level can explain why these industrial characteristics would be similar across countries.

In contrast, the total size of exports by industries is very different. Models with comparative advantage can explain why total exports by industry would differ across countries (something we do not focus on in this paper).

An additional prominent feature in the data is the high correlation between entry and exit. This is consistent with the low one-year survival rates observed in the data across industries and countries—that is, entrants are very likely to exit. The presence of so much entry and exit by the same firms, suggests that there must be uncertainty in the viability of exporting at the firm level that can only be resolved by entry.

Although our analysis focuses on country-industry differences, a potential concern about the data is that the sample varies by year across countries. To determine if this is likely to create a bias, we decompose the variance in the number of firms, entry exit and survival by industry and country, and time. In addition, we decompose the variance by industry-year and country-year, allowing year-to-year variation by industry and country. As shown in Table 4, in all cases the majority of variation in number of firms, entry and exit is caused by industrial variation. A very small percent of the variation is due to time effects. We also perform this analysis for total exports. In this case, industry, country, and year effects do not explain much, most of the variation is contained in the residual. Like the correlations, this evidence suggests that there are industry characteristics which drive the number of firms, entry, exit, and to a lesser extent survival; but which are not related to total exports.

III. Theoretical Framework

There are several important features of exporting that we want to capture in the model. As is well known, and confirmed above, exporters vary in size, so we use a heterogeneous firm framework. In addition, there is a lot of entry and many of the new firms exit. To generate this we assume there are entry costs and uncertainty at the firm level about profitability in the foreign market. Discussions with exporters highlight that firms often test markets with small trials when entry costs are large, as this allows them to postpone some of sunk costs associated with exporting until they know it is profitable. In an extension of the model, we investigate how postponing a portion of entry costs affects entry and survival.

Specifically, the assumptions of our model are as follows. First, there are heterogeneous firms in terms of ability. The ability of the firm is related to management skills and technical knowledge. Second, there is idiosyncratic uncertainty—a firm does not know how costly it will be to export a particular product to a given market until the firm tries. Third, there is a sunk cost of entry into exporting, reflecting changes to the product, required paperwork, and the gathering of market information that must be completed before exporting. The model is meant to be illustrative and highlight the way firms behave; it does not take into account general equilibrium effects. We first describe the basic model and then we discuss how the model changes if small trials are possible.

i. Basic Model

We start with a firm, of type α_i, where α ranges from *0* to *1*, and a higher α represents a greater level of productivity. It is the amount of product the firm can produce and it is known.

In this model, there are two segmented markets: foreign and domestic. If a product is sold in foreign market k (k denotes the product-market combination), the firm receives price P_k, which is known. For example, a firm can observe the price of a specific product in a specific market and knows how much he can produce, thus he has a very good estimate of potential revenues from that product-market combination. If the product is sold domestically, the firm charges a price P_D.

Foreign and domestic markets entail distinct costs. A firm serving the foreign market pays a sunk entry cost and a fixed per-period cost of exporting (i.e. a fixed overhead cost). A firm selling to the domestic market pays only a fixed per-period cost. Specifically:

- C_k is the overhead cost that a firm pays to export to foreign market k. This cost is associated with bureaucracy and logistics. This cost is unknown to the firm before exporting, and it is not revealed until he exports. The firm has an expectation of what this cost will be before trying to export. Specifically, with probability q he gets a low cost draw, C_k^L, and with probability $(1-q)$ he receives a high cost draw, C_k^H.
- F is a sunk cost of entry into a foreign market. This is the cost that the firm has to incur to adapt his factory or his land to produce a particular product for export.
- C_D is the overhead cost that the firm pays to serve the domestic market.

We assume that the overhead cost of exporting, C_k, is larger than the cost in the domestic market C_D. The intuition is that exporting requires the producer to get the product through local distribution to the ports as well as through foreign distribution. In addition, we assume that for export goods the price in the foreign market, P_k, is larger than the price in the domestic sector, P_D.[5] In other words, only goods with the foreign price above the domestic price will be

[5] For example, Freund and Pierola (2010) find that Peruvian agriculture (a key export) fetches a significantly higher price in international markets than in domestic markets.

exported. Given the higher costs of accessing the foreign market, P_k must be greater—at least by the (average) cost of exporting- for the firm to have incentive to export to that product-market.

The sequence of decisions to be made by the firm's manager is the following. First, he decides whether to enter the export sector or the domestic sector. If he goes to the domestic sector he earns $\alpha_i P_D$ and pays C_D. He receives profits ($\alpha_i P_D - C_D$) for life, discounted at the rate δ. If the firm enters the export sector, he earns $\alpha_i P_k$ and pays the realization of the overhead cost of exporting, C_k, plus the sunk cost F in the first period. As noted above, there are two possibilities for the cost of exporting: with probability q, the exporter will obtain a low cost, C_k^L, and with probability $(1-q)$, he will obtain a high cost, C_k^H.

To concentrate on the trade-off that is important in the data, we impose a number of regularity conditions on the parameters. First, we assume that P_k-C_H>P_D-C_D, so that exporting is always more interesting than domestic sales on a period-by-period basis for a firm with the highest quality. Second, we assume that the sunk cost, F, is small enough such that some firms attempt exporting even if they may exit ex-post. Specifically, a sufficient condition is that there exists an α_i, such that expected lifetime profits given the entry cost are positive, but given a high overhead cost the firm prefers to exit $(\frac{\alpha_i P_k - E(C_k)}{1-\delta} - F > \frac{\alpha_i P_D - C_D}{1-\delta} \; \& \; \alpha_i P_k - C_H < \alpha_i P_D - C_D)$, where $E(C_k)$ is the expected overhead cost of exporting.

Now, we can solve the model backward. We examine what happens in the second period to a firm that entered the export sector in the first period. The decision is whether to stay in or exit the foreign market given the realization of C_k. This will depend on the profits from staying versus shifting to the domestic sector. Subsequent to entry, the profits from staying in the export sector are

$$Profit_{stay} = \frac{1}{1-\delta}(\alpha_i P_k - C_{ik}),$$ and the profits from exit are

$$Profit_{exit} = \frac{1}{1-\delta}(\alpha_i P_D - C_D).$$

The threshold α, above which firms choose to stay in the export market (α_{stay}), can be calculated by comparing exporter profits if the firm remains in the foreign market forever ($Profit_{stay}$) and profits if the firm exits the foreign market after one period and goes to the domestic sector ($Profit_{exit}$). $Profit_{stay}$ must be larger than or equal to $Profit_{exit}$ for the firm to continue exporting. This implies that the threshold for staying in the export market is

(1) $$\alpha_{stay}(C_{ik}) \geq \frac{C_{ik} - C^D}{P_k - P_D},$$

Where $C_{ik} \in C_k^L, C_k^H$. Given the regularity conditions mentioned above, we know that α_{stay} is positive. All firms with an α_i equal to or above this threshold, given the realization of their overhead cost, will continue exporting.

Now, having solved for the cutoff α_{stay} in the second period, we go back to the first period and solve for the threshold level of α for the firm to enter the export sector. In order for a firm to enter the export sector, it must be the case that the value of entry into exporting exceeds the value of going to the domestic sector. There are two possibilities for entry. In the first case, a firm enters and stays in the foreign market irrespective of the cost draw. This is the case for highly productive firms, those with α above $\alpha_{stay}(C^H)$ in Equation 1. This yields the value function of entry

(2) $$V_{Xistay}(\alpha, P_k, C_k^L, C_k^H, F, P_D, C_D) = q\left[\frac{1}{1-\delta}(\alpha_i P_k - C_k^L)\right] + (1-q)\left[\frac{1}{1-\delta}(\alpha_i P_k - C_k^H)\right] - F \cdot$$

The first term on the left is the lifetime profit from a good cost draw; the second term is the value from a high cost draw and the final term is the fixed cost.

In the second case, a firm enters the export sector and stays only if he receives a low cost draw—he exits the foreign market if the cost is high. This is the case for firms with α above $\alpha_{stay}(C^L)$ but below $\alpha_{stay}(C^H)$.[6] The value function in this case is

(3) $$V_{Xiexit}(\alpha, P_k, C_k^L, C_k^H, F, P_D, C_D) = q\left[\frac{1}{1-\delta}(\alpha_i P_k - C_k^L)\right] + (1-q)\left[(\alpha_i P_k - C_k^H) + \frac{\delta}{1-\delta}(\alpha_i P_D - C_D)\right] - F.$$

The first term on the right is the value from getting a low cost draw and remaining in the export sector forever. The second term is the value from getting a high cost draw and going to the domestic sector after one period. The final term is the fixed cost of entry.

For firms to enter the export sector, the expected value of an export trial (Equation 2 or 3, depending on α) must be larger than the value of producing for the domestic sector. The value of selling domestically, V_{Di}, is

(4) $$V_{Di} = \frac{1}{1-\delta}(\alpha_i P_D - C_D).$$

Thus, the cutoff for entry lies at the intersection of Equations (3) (where firms enter and stay if the cost draw is low, but exit if the cost draw is high) and (4) (the value of domestic production). The cutoff in Equation 5 defines the lowest α firm that will enter.

(5) $$\alpha_{entry} > \frac{qC_k^L + (1-q)C_k^H - C_D + q\frac{\delta}{1-\delta}(C_k^L - C_D) + F}{(P_k - P_D) + q\left[\frac{\delta}{1-\delta}(P_k - P_D)\right]}$$

[6] Note that a firm will never enter and then exit if the cost draw is low. If the value of entry (where cost is unknown) is greater than being in the domestic sector then it must be the case that the value of staying with a low cost draw is better than being in the domestic sector since $C_L < E(C_k)$.

Again, given the regularity conditions mentioned above, this cutoff is positive.

It is straightforward to show that, given the regularity conditions, $\alpha_{stay}(C^H)$ is above α_{entry} and thus some firms exit in equilibrium. The difference between the two cutoffs is

(6) $$\alpha_{stay}(C^H) - \alpha_{entry} = \frac{q\frac{1}{1-\delta}(C_k^H - C_k^L) - F}{(P_k - P_D) + q\left[\frac{\delta}{1-\delta}(P_k - P_D)\right]}.$$

The gap described in Equation (6) reflects the range of α for which the enter-exit strategy is valid. It is increasing in the difference between C_k^H and C_k^L and the probability of getting a low draw, q. It is decreasing in the difference between P_k and P_D and the entry cost. The intuition for the gap between the high and low cost is that there is an option value of exiting if the cost is high. This option value is higher when C_k^H is very high. This implies that more uncertainty in the form of a bigger gap leads to more entry and exit in equilibrium, all else equal. The gap for entry and exit is also increasing in q. The intuition is that if the probability of a good draw is higher more firms will enter, but the cutoff α to stay does not depend on q. Interestingly, a small difference between P_k and P_D leads to a larger range of α between entry and staying. The reason is that when this difference is small, more of the gain from the foreign sector is coming from low costs, which is where the uncertainty lies. A higher sunk cost makes entry more costly, as the entry cost rises the range of α for which there is entry and exit declines. For given q, F, C_k, and P_k, the proportion of exits also depends on distribution of α.

Proposition 1: Entry is decreasing in the sunk entry cost (F) and increasing in uncertainty (C^H-C^L), all else equal.

We can represent the decision of the firm in Figure 1. The three lines represent the value of serving the domestic sector (Equation 4), the value of entering the export sector and exiting if the realization of cost is high (Equation 3), and the value of staying in the export sector irrespective of the cost (Equation 2). Agents with α above α^* can profitably produce for the domestic market, while those with an α below α^* are not entrepreneurs. Firms with α above α_{entry} will enter the export market. If α is between α_{entry} and α_{stay} the firm exits in the second period if the cost of exporting is high and remains if the cost is low. Firms with α above α_{stay} always find the exporting sector more profitable than the domestic sector, irrespective of the realization of C_k. The bold curve represents the firms' expected value of producing based on its type.

In sum, there are three groups of firms: (i) those who do not enter into exporting but serve the domestic sector; (ii) those who enter into exporting and stay if they get a low C_k but exit the foreign market if they get a high C_k; and (iii) those who enter into exporting and continue exporting forever regardless of the type of overhead cost they obtain.

ii. <u>Small Export Trials</u>

Next, we consider what happens if firms can enter the export market with only a fraction, θ_k $(0<\theta_k<1)$, of their effort in the foreign sector (and the rest in the domestic sector) and expend only a fraction of the entry cost. The intuition is that instead of adapting all production to the export market, a firm can try a small transaction first. This allows firms to test the foreign market, and thus for a given F there will be a larger range of firms using the enter-exit strategy.[7]

[7] In a different type of model, with costly search, Rauch and Watson (2003) show that a developed country buyer may prefer to start with a small trial if he is uncertain of the developing country firm's ability to fill a large order. Their model predicts that small starts are less likely to last as long as large ones; and that sectors characterized by

In addition, we assume that a small trial comes with an added cost T/θ. The intuition is that small trials tend to be more costly in terms of shipping (it is well known that ad valorem shipping costs decline rapidly in the value sent) and/or require a fixed cost (for example, to find an importer that is willing to accept a small transaction).[8]

Again, we solve the model backwards. In the second period, there is a cutoff α for the firms that always stay in the foreign market. The difference from the basic model is that if the firm chooses to remain in the export sector, it must pay the remainder of its sunk cost in this period. This cutoff level can be found from the comparison of the profit equations in the second period:

$$Profit_{stay} = \frac{1}{1-\delta}(\alpha_i P_k - C_k^H) - (1-\theta_k)F, \quad \text{and}$$

$$Profit_{exit} = \frac{1}{1-\delta}(\alpha_i P_D - C_D).$$

From solving this, we obtain:

$$(7) \quad \alpha_{staysmall} \geq \frac{C_k^H - C^D + (1-\theta_k)(1-\delta)F}{P_k - P_D}$$

The cutoff level to stay in the market in the second period is similar to the previous one in Equation (1), however, in this case, the cutoff depends on the size of the trial in the first period, θ_k. A firm that paid the full entry cost in the first period ($\theta_k = 1$) faces the identical cutoff as in the previous case. But, a firm that paid only a fraction ($\theta_k < 1$) must now have profits from

small starts have either a lot of uncertainty or high search costs. However, in their model, search is initiated by the importer and thus the analysis does not offer direct insights into overall rate of entry in the exporting country.

[8] There is typically a 50 percent cost reduction per cubic foot when shipping a 40’ container as compared with a 20’ container across the ocean. Similarly, air rates per lb fall 50 percent when sending 1000 lbs as compared with 100 lbs. (For examples, see http://cyprusindustries.com/faq_freight.html.)

remaining that are high enough to cover the rest of the cost. Smaller trials make staying less attractive in the second period because the fraction of *F* that still must be expended rises.

Proposition 2: Small trials makes continuing less likely, because the remainder of the entry cost must be paid in the second period to continue.

In the first period, the associated value of entry is as follows:

(8)

$$V_{Xi}(.) = q\left[\theta_k(\alpha_i P_k - (C_k^L + \frac{T}{\theta}) - F) + \frac{\delta}{1-\delta}(\alpha_i P_k - C_k^L) - (1-\theta_k)\delta F\right] + (1-q)\left[\theta_k(\alpha_i P_k - (C_k^H + \frac{T}{\theta}) - F) + \frac{\delta}{1-\delta}(\alpha_i P^D - C^D)\right] + (1-\theta_k)(\alpha_i P^D - C^D)$$

The first term is the value of getting a good cost draw after starting with a small trial θ_k. In period 2, all resources are moved to the foreign sector and the remainder of the entry cost, *F*, is paid. The second term is the value of getting a bad cost draw. In this case, the firm shifts all resources to the domestic sector in the second period, and does not pay the remainder of the sunk cost, *F*. The final term is the return from putting the remainder of effort in the domestic sector in the first period, while making a trial in the export sector. The cutoff α for an export attempt will be at the intersection of Equation (8) and Equation (4), the value of producing only for the domestic sector.

Comparing Equations (8) and (4) yields a cutoff level of productivity for entry into exporting of

(9) $$\alpha_{entrysmall} \geq \frac{\theta_k(q(C_k^L) + (1-q)(C_k^H) - C^D) + q\frac{\delta}{1-\delta}(C_k^L - C_k^D) + \theta_k F + q(1-\theta_k)\delta F + T}{\theta_k(P_k - P^D) + \left[\frac{q\delta}{1-\delta}(P_k - P^D)\right]}$$

If θ can be very small, a firm will attempt entry provided that profits—inclusive of the entry cost—are positive at a low cost. To see this, note that as θ approaches zero the cutoff is

(10) $$\alpha_{entrysmall} \geq \frac{F + \frac{1}{1-\delta}(C_k^L - C^D) + T}{\left[\frac{1}{1-\delta}(P_k - P^D)\right]},$$

which is exactly the cutoff for entering if a low cost draw is guaranteed and T is small (*q=1* in Equation 5). Relatively low α firms will choose to start small since this reduces the entry cost that is paid if the cost draw is high. This expands the region between α_{entry} and α_{stay}. It also partitions entrants by type. Good entrants will pay full cost up front and enter big to get profits up front. In contrast, weak entrants will enter with small trials to save on entry costs if they get a bad draw. Thus, for a given *F*, as small trials become more common, we should see more entry and more exit. The intuition is that the firm can discover his cost by making a very costless and cheap trial. For firms that are very good, above α_{stay}, there is no incentive for making a small trial because they are always better off in the export sector than in the domestic sector. But, for weaker firms the feasibility of a small trial is very valuable. Form equations (9) and (10), this is especially true when uncertainty is high (C^L is low).

Proposition 3: When entry costs are high, relatively low α firms will choose to start with small trials since this reduces the entry cost that is paid if the cost draw is high.

Proposition 4: For a given fixed cost, a larger share of firms enter with small trials when uncertainty is greater.

Finally, the choice between normal entry and small trials depends on the relative magnitudes of *F* and *T*. Specifically, comparing Equations (3) and (8), a sufficient condition to prefer normal entry is

$$F \leq \frac{T}{(1-q\delta)(1-\theta)}.$$

Proposition 5: For low fixed cost, firms prefer normal entry.

iii. Model Implications and Empirical Strategy

One unfortunate feature of the basic model—and these types of models more generally—is that they do not distinguish greater uncertainty from entry costs. In particular, there is more entry if there are relatively low entry costs (F) in the sector and uncertainty (C^H-C^L) is constant across sectors; or, if there is relatively greater uncertainty in a sector and entry costs are constant across sectors. The reason is that more uncertainty means a greater range of firms will be profitable if they get a good cost draw—the option value of entry is higher. Similarly, a lower entry cost makes entry profitable for a wider range of firms.

In order to distinguish between uncertainty and entry costs, we use small trials.[9] In particular, we assume that small trials are only cost effective if entry costs are above a certain level F*, as discussed in Section ii. In this case, if differences in entry rates across industries are a result of entry costs, then a lower average entrant transaction size relative to the average transaction size of an incumbent should lead to lower entry rates. That is, more firms performing small trials means that the entry cost is high and fewer firms would be profitable even in the

[9] For example, Das, Roberts and Tybout (2007) make an assumption about the form of uncertainty that firms face, which allows them to estimate entry costs.

event of a good draw. In contrast, if entry costs are relatively high and constant across all industries while uncertainty is variable then a greater share of firms will undertake small trials when there is greater uncertainty. Thus, in this case, the relative size of an entrant to an incumbent should be negatively correlated with the entry rate.

To see this more formally, note that the average relative size of an entrant relative to an incumbent (RS) in the basic model is

$$RS_{basic} = \frac{E(\alpha|\alpha > \alpha_{enter})}{\rho E\left(\alpha\middle|\alpha_{enter} < \alpha < \alpha_{stay}\right) + (1-\rho)E(\alpha|\alpha > \alpha_{stay})},$$

where the P_ks all cancel, and ρ is the share of firms that used the entry-exit strategy out of the total number of survivors. So for low entry costs, the relative size depends on ρ. When ρ is zero or one the relative size is one. That is, if all firms follow the entry-exit strategy then entrants look like survivors. Similarly, if all firms that enter are above the threshold for staying irrespective of the cost draw then entrants resemble survivors. Thus, for the basic model relative size does not have a linear relationship with entry—in fact, it is U-shaped and hovers around one.

If entry costs are variable, as they rise firms will start small trials. Thus, small relative entrant size is associated with high fixed costs and therefore lower entry. Hence, the entry rate and relative size should be positively correlated.

If entry costs are high, and uncertainty is variable, then some firms always choose small starts. With small starts, relative size is

$$RS_{small} = \frac{\theta\sigma E\left(\alpha\middle|\alpha_{enter} < \alpha < \alpha_{stay}\right) + (1-\sigma)E(\alpha|\alpha > \alpha_{stay})}{\rho E\left(\alpha\middle|\alpha_{enter} < \alpha < \alpha_{stay}\right) + (1-\rho)E(\alpha|\alpha > \alpha_{stay})},$$

Where σ is the share of entrants that follow the enter-exit strategy. Note that σ must be greater than or equal to ρ. The intuition is that since the survival rate is less than one, the firms using the enter-exit strategy must have a smaller weight in total survivors than in total entrants. As uncertainty increases for a given F, the share of firms following the enter-exit strategy (σ) rises. The numerator declines more rapidly than the denominator because more weight is on the firms making small trials ($\theta\alpha P$). While in the denominator, firms in the first group and in the second group do not so look different in terms of size because survivors no longer make small shipments, after the first one is successful. For example, in the extreme, when uncertainty is large and when $\sigma=\rho=1$, and all firms use the entry-exit strategy, the relative size will be very small because no firms start with normal-sized transactions. In this case, more uncertainty is associated with lower relative size and more entry, so relative size and entry should be negatively correlated.

In order to examine these issues we need a measure of entry costs. We use the average size of exports (at the annual or transaction level) of an incumbent in a sector as a proxy for entry costs. In sectors where average exports are larger, entry is likely to be more difficult. To distinguish between uncertainty and entry costs we include entrant size relative to average incumbent size in the regression equation. The basic regression equation is

$$(11)\qquad \textit{Entry rate}_{ij}=\alpha_i + \beta\ \textit{lnsize}_{ij}+\gamma(\textit{sizeentrant/sizeincumbent})_{ij}+X_i+\varepsilon_{ij}$$

where i is country, j is industry; α_i are a series of country fixed effects, and X_j are industry controls such as world tariff, and demand. If entry costs are important we expect β to be negative and γ to be positive, indicating that higher entry costs lead to less entry, especially if they are so high that they require small trials. If uncertainty is more important, we might also expect β to be negative, assuming more uncertainty leads to more entry by weaker firms with small exports. But, with variable uncertainty and constant entry costs, we expect γ to be negative, indicating that when there is a lot of uncertainty firms use small trials to test the market and entry is greater.

In sum, if entry costs, uncertainty, and small starts are driving the results then the predictions from the model are:

1. Entering firms that start with relatively small trials, as compared with other entrants and incumbents, are more likely to exit.
2. In industries with low sunk costs or more uncertainty there is more entry, exit, and lower survival.
3. If uncertainty is driving the results, relative size (entrant size/incumbent size) should have a negative effect on entry; if entry costs are driving the results then relative size should have a positive effect on entry.

IV. Results

The high country-pair correlations we saw in Section II imply that there are fundamental features of industries that drive entry and exit in a sector. The model shows that prime suspects are entry costs and uncertainty. In particular, when entry costs are low, the industry is very likely to have high entry and exit rates and low survival rates. As we do not have a precise measure of entry costs, we begin by examining average firm export size as a proxy for entry costs. In addition, the model suggests that if entry costs are sizeable and can be postponed then firms will test the market with small shipments. This implies that new firms will have smaller average shipments transactions than existing firms, especially in sectors with large entry costs. As starting small in sectors with high entry costs is key to our identification strategy, we examine this first. Second, the model suggests that firms that start relatively small are more likely to exit because these firms are testing the market and need to get a positive shock to survive.[10] Finally, we examine the effect of average size and relative size on entry, exit, and survival (Equation 11).

For the analysis, in order to make the data as comparable across countries as possible, we use the same timeframe across countries, in most cases 2004-2008. The first column of Table 5 reports the average annual exports of entrants and incumbents. Incumbents are on average 21 times larger than entrants. For the entrants, it also reports the average initial size of firms that survive ex post and firms that exit. Survivors have larger annual exports in their first year than exiters by a factor of 8. In all industries, incumbents are larger than entrants on average; and in 95 percent of industries, survivors are bigger on average than exiters.

A serious concern with annual data is that we know that many entrants exit after just one shipment. This implies that entrants that exit will be especially small because in many cases we are comparing annual data for one-shipment firms with annual data for multiple-shipment firms. Using data from six countries with daily transaction data, we reproduce these averages using the average transaction for incumbents, entrants, survivors and exiters.[11] A similar pattern emerges. In five out of six countries, incumbents are bigger than entrants and survivors are bigger than exiters, though ratios are smaller than with annual data. In all six countries, the majority of

[10] In a similar vein, Besedes (2008) examines hazard rates of US imports by industry and finds that large initial-year exports lead to large hazard rates. However, using annual data is problematic since many one-year exports are single shipment exports, thus comparing starts may actually be comparing different things. Moreover, in industrial data the problem is compounded because larger initial exports are likely to represent more firms, in which case the change of at least one surviving is greater.

[11] A shipment or transaction is defined as the daily transaction in a product by a firm.

sectors exhibit this pattern. The fact that in all countries, some sectors have entrants of similar size to survivors suggests that while starting small is important—it is not important in all sectors.

If firms are testing the market then firms that start small should be especially likely to exit. As the model shows, good firms know they are good and hence do not start with small transactions. The firms that test the market, start with small shipments and expand if they receive a good cost draw. To examine this, we use data from the *entrants only* and regress exit (exit equals one if the firm exits after one year) on the average transaction size of the entrant in the first year. In this case, because of the problem with multiple-transaction and single-transaction firms in the annual data highlighted above, we use only data from the five countries with daily data.[12] The variable of interest is transaction size. We include country-, industry- and year- controls.[13] The results, reported as marginal effects from a Probit regression in Table 6, show that new firms that enter with large shipments are less likely to exit.[14] Specifically, a 10 percent increase in shipment size decreases the likelihood of exit by about 2 percentage points.

Our identification strategy relies on small starts being more important in relatively high entry-cost sectors. We next split the data by size of the average transaction of a firm in an industry. We would expect that in sectors with large transactions, small starts are more important and hence being a firm with a small start is more indicative of weakness. The results are reported in the last four columns of Table 6. Starting small has a much bigger effect on exit in sectors where large transactions are prominent.

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[12] Using annual data will overstate effect of size on exit since many firms that exit have only one shipment. Indeed, results are much stronger if we use annual data.
[13] We also try country-industry and year controls and results are almost identical.
[14] We also estimated the equation with OLS and results are similar.

Results from Tables 5 and 6 support the hypothesis that weak entrants test the market with small transactions, especially in sectors with large entry costs. We now examine the relationship between entry rates and average incumbent export size, which proxies for entry costs. We use incumbent size because when entry is high there may be many single-transaction entrants, which drives down annual exports and potentially create a reverse causality problem. Thus, average annual exports—or similarly average entrant exports—may be negatively correlated with entry rates simply because industries with a large share of entrants have, by construction, more weight on the entrants with small annual exports. Because the dependent variable is a proportion, we use a generalized linear model (glm) with a logit link and the binomial family and report robust standard errors. In all specifications, we include country-fixed effects to control for overall country characteristics that may influence entry, exit, and survival. In some specifications, we also control for industry-fixed effects.

Figure 3 shows the strong correlation between average incumbent size and entry, exit, and survival rates. Table 7 reports the results. The average size of exports is highly significant, with the expected sign in all cases. The results imply that a 10 percent increase in export size in a country-industry results in 1.4 percentage points lower entry and exit rates and 0.7 percentage points higher survival rate. Next, we include the relative size of entrant exports to average firm exports. Relative exports come with a positive sign, suggesting that that variation in entry costs across industries is more important than uncertainty variability in determining entry rates.

Small incumbent exports could be associated with other industry characteristics, such as lots of firms and lots of entry and exit. Perhaps these are simply industries where many small firms participate and both entry and exit are high. We include the log of the number of firms in each sector to control for this possibility. It is not significant, neither for entry nor for exit, implying that entry and exit rates are not correlated with the number of firms. Survival is positively correlated with the number of firms. This is sensible, when more firms survive the number of firms increases.

One possibility is that size is picking up global industry demand. In this case, more firms may enter in large and growing sectors. This may include many small firms, which lowers the average value of firm exports. In this case, the coefficient on size would be biased down. It could also lead to stronger incumbent exports, raising the average value, and biasing the coefficient on incumbent exports up (toward zero). We include the log of world imports in the industry, average annual growth in the industry, and the log of one plus the tariff rate to control for global demand. As these variables are at the industry level, we cluster standard errors by industry in this specification. The results are shown in Table 8. As expected, stronger world demand has a positive effect on entry rates. Entrant size remains highly significant and magnitude of the coefficient increases slightly , suggesting that incumbent firms are larger when conditions are good.

It is possible that variables similar to those that drive entry in domestic data are at work. We next reclassify the data to be in similar sectors to Samaniego (2009), who examines entry rates in domestic industry. His classifications are broader, with only 19 tradable sectors. We regress entry and exit rates into exporting on entry and exit into domestic production. The results are shown columns 5 and 6 of Table 8. The correlations between domestic entry and export entry, and between domestic exit and export exit, are not significant and the variables of interest remain qualitatively unchanged.[15]

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[15] An additional concern is that many of the firms may be intermediaries, i.e. not producers. This may be more common in sectors with small exports and these firms may be responsible for lots of entry and exit. To control for

We also include industry-fixed effects in the last three columns of Table 8, and again the results are robust. In addition, our premise is that entry costs by industry are similar across countries, we expect the coefficients to fall substantially when industry fixed effects are included. The coefficients on entry and exit are 30-35 percent larger without industry effects, and those on survival are 20 percent bigger (using the same sample without industry fixed effects from Table 7 as the comparison).

Using annual data may be problematic because what should matter for entry is transaction size as opposed to annual exports. In addition, there is a possibility that high entry rates in some sectors push incumbents to be smaller in the long run—leading to reverse causation. (Though the positive correlation between size and survival rates seems to contradict this explanation, since if entry pushed incumbents to be smaller we would expect survival would too.) We next use daily transaction data for six countries for which we have it (Cambodia, Kenya, Mauritius, Malawi, Peru, and Tanzania) and calculate the average transaction size and the relative size of an entrant to an incumbent. To ensure that these are industry effects and not something specific to the country in these industries, we regress entry, exit, and survival rates from the other nine countries on these variables. Results are reported in Table 9. The average transaction size of from the six is a very good predictor of average entry, exit and survival rates by industry in the other nine countries, and relative size is again positively correlated with entry.

A final test of the importance of average size, which should also not suffer from reverse causation, is we examine the sensitivity to export size on the entry rate in countries with higher

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this possibility, we used data gathered from Chinese firms by Khandelwal et. Al (2010) and include a variable for share of firms by sector that are intermediaries and also share of output through intermediaries. Neither variable is significant. A simple premise of our analysis is that it is common features that are driving entry across countries. So although this variable is from China, unless China is an outlier, it should adequately pick up effects of intermediaries in the data.

costs of entry. We use country-industry data on entry rates and annual incumbent exports. We use the number of days it takes to export from the World Bank's *Doing Business* report from 2007 (which is data for 2006) to measure a country's entry cost. We define a country to have a high entry cost if it takes above the median number of days to export from all countries in the *Doing Business* sample (22 days). In this specification, we control for both country and industry fixed effects. We focus on the interaction between industry entrant size and country entry costs. If size is a good measure of industry entry costs then we would expect it to be more important in discouraging exports in countries with high costs of exporting, as measured by the number of days. The results in Table 10 suggest this is the case. The interaction shows that an increase in export size by 10 percent reduces entry by .4 percentage points more in high cost countries than in others.

V. Conclusions

We use customs data from fourteen countries and find many commonalities in the industrial structure of exports. While total size of exports by 66 SITC industries is very different among the countries; the relative number of firms, entry, exit, and survival rates are extraordinarily similar. We show that this can be explained by a heterogeneous-firm model with uncertainty and sunk entry costs that are similar across industries. Our results confirm the presence of entry costs, uncertainty and market testing behavior; and point to sunk entry costs being relatively more important than uncertainty as a determinant of entry and exit rates across industries. Given high entry rates and market testing behavior in most industries, the concern that entry-costs discourage participation in exporting is overstated.

References

Ahn, J., A. Khandelwal and S. Wei (2010) “The Role of Intermediaries in Facilitating Trade” NBER Working Paper 15706.

Albornoz, Calvo Pardo, Corcos and Ornelas (2010) “Sequential Exporting” London School of Economics, CEP Discussion Paper 0974.

Alvarez, R. and R. Lopez (2008) “Entry and Exit in International Markets: Evidence from Chilean Data” *Review of International Economics* 16(4): 692-708.

Amurgo-Pacheco, A and M.D. Pierola (2008) “Patterns of Export Diversification in Developing Countries: Intensive and Extensive Margins” World Bank, Policy Research Working Paper 4473.

Baldwin, R. E. (1988) “Hysteresis in Import Prices: The Beachhead Effect” *American Economic Review,* September 1988, 78(4): 773-85.

Baldwin, R. E. and P. Krugman (1989) “Persistent Trade Effects of Large Exchange Rate Shocks” *Quarterly Journal of Economics,* November 1989, 704(4): 635-54.

Besedes, T. (2008) “A Search Cost Perspective of Formation and Duration of Trade” *Review of International Economics* (2008), 16 (5), 835-849.

Besedes, T. and T. Prusa (2010) “The Role of Extensive and Intensive Margins and Export Growth” *Journal of Development Economics,* forthcoming.

Dixit, A. (1989) “Entry and Exit Decisions Under Uncertainty.” *Journal of Political Economy,* June 1989a, 97(3): 620-38.

Eaton, J. , M. Eslava, M. Kugler and J. Tybout (2008) "Export Dynamics in Colombia: Transactions Level Evidence" NBER Working Paper 13531.

Freund, C. and M. Pierola (2010) “Export Entrepreneurs: Evidence from Peru” World Bank Policy Research Working Paper 5407.

Iacovone, L. and B. Javorcik (2010) “Multi-Product Exporters: Product Churning, Uncertainty and Export Discoveries” *The Economic Journal* 120: 481-499.

Melitz, M. (2003) “The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity” *Econometrica,* 71: 1695-1725.

Rauch, J. and J. Watson (2003) “Starting Small in an Unfamiliar Environment” *International Journal of Industrial Organization,* Vol. 21: 1021-1042.

Roberts, M. and J. Tybout (1997) "The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs" *American Economic Review,* 87(4): 545-564.

Samaniego, Roberto “Entry, Exit, and Investment-Specific Technical Change” *American Economic Review*, 100(1): 164-192.

Segura-Cayuela, R. and J. Vilarrubia (2008) “Uncertainty and Entry into Export Markets” Banco de España Working Paper No. 0811.

Volpe Martincus, C. and J. Carballo (2008) “Is Export Promotion Effective in Developing Countries? Firm-level Evidence on the Intensive and the Extensive Margins of Exports” *Journal of International Economics* 76: 89-106.

Figure 1: Exit and Entry by Firms

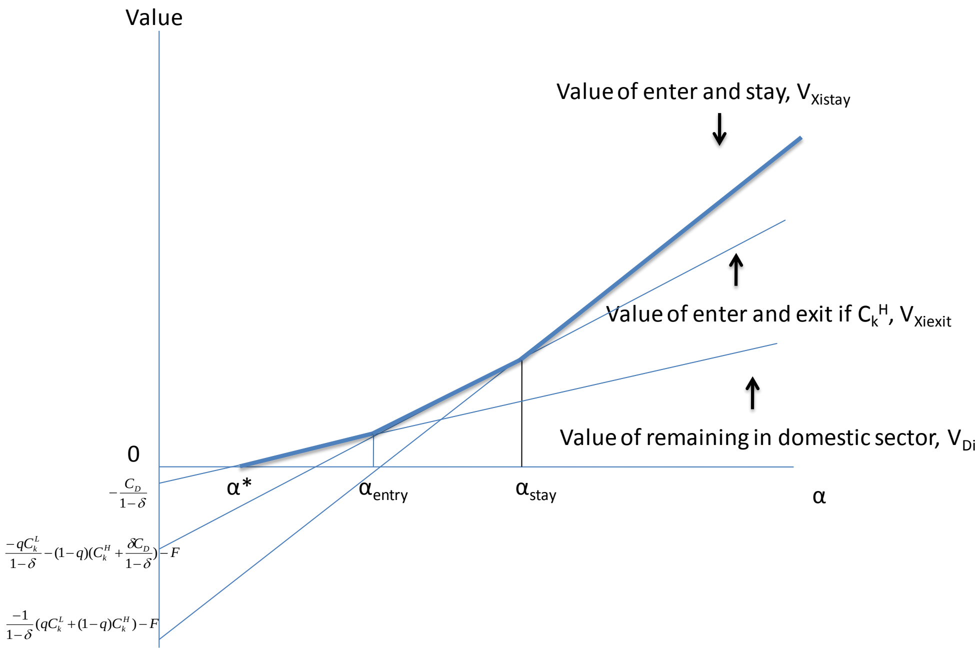


Figure 2: Entry with Small Starts

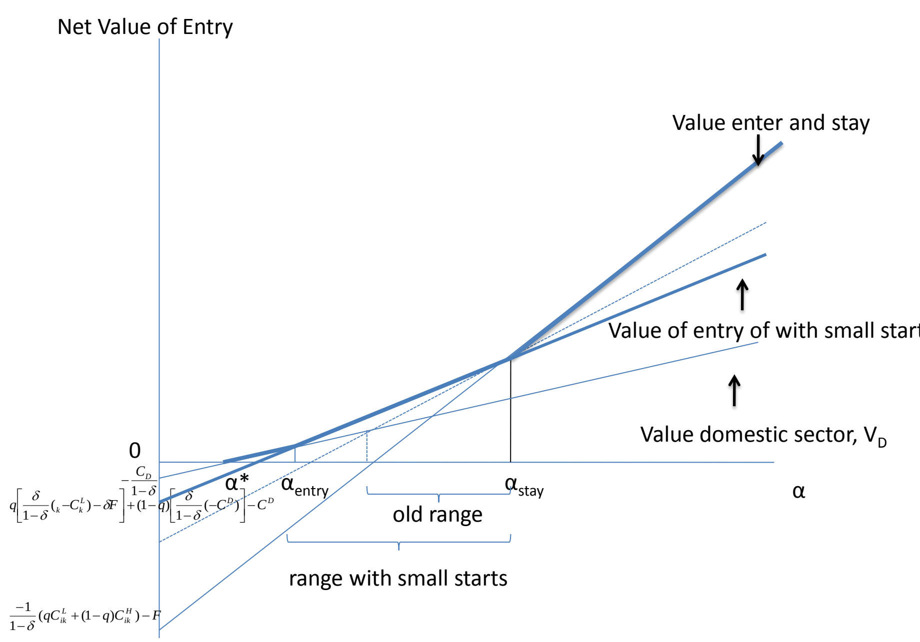
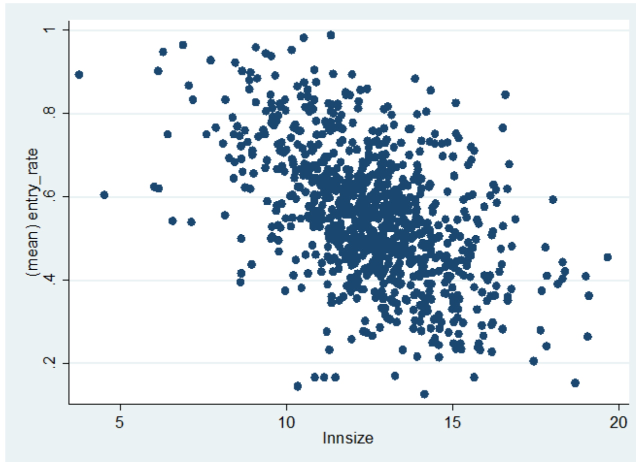
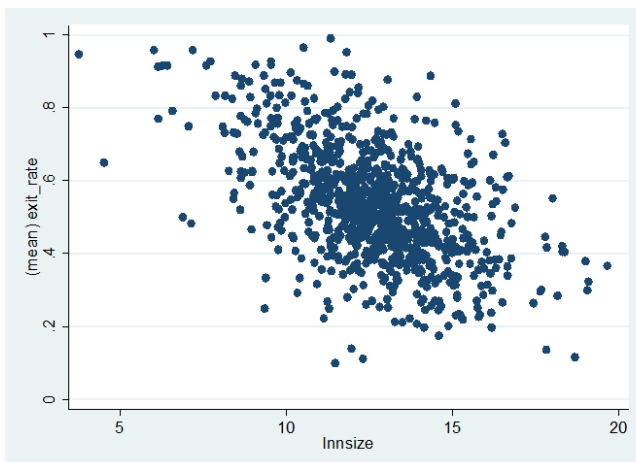


Figure 3: Entry, Exit and Survival vs. Size

a) Entry vs. Size



b) Exit vs. Size



c) Survival vs. Size

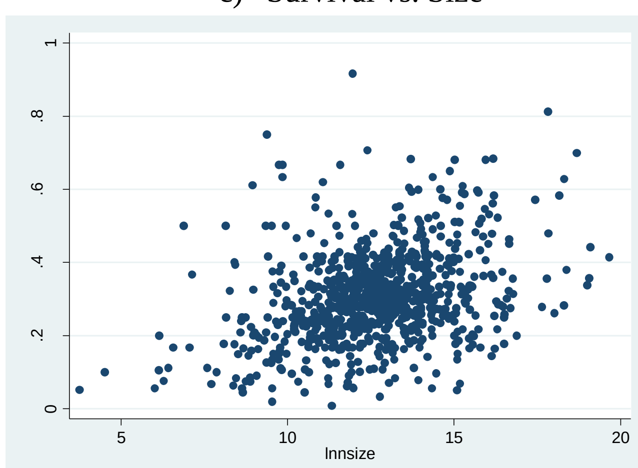


Table 1: Statistics by Country

Region/Country	Period	Number of firms	Avg annual size	Entry rate	Exit rate	1y-Surv rate	Avg size ent.	Avg size incumb.
				Annual average				
Africa								
KEN	2006 - 2009	5,056	849,888	39%	41%	35%	65,542	1,469,013
MLI	2005 – 2008	303	2,559,628	43%	39%	46%	143,797	4,628,361
MUS	2003 - 2009	1,924	1,232,004	44%	46%	27%	111,761	2,119,775
MWI	2005 – 2009	754	1,159,901	66%	64%	19%	232,334	3,454,516
SEN	2003 - 2008	595	1,801,078	38%	34%	40%	155,977	2,799,595
TZA	2003 - 2009	1,368	1,358,911	48%	41%	38%	101,239	2,559,788
Asia								
KHM	2003 – 2009	574	6,054,751	35%	31%	49%	1,532,610	8,610,692
Eastern Europe								
ALB	2004 - 2007	1,695	496,234	38%	33%	45%	85,907	779,032
BGR	2003 -2006	14,911	775,105	42%	44%	32%	68,670	1,274,965
Latin America								
CHL	2003 – 2009	7,220	6,407,405	36%	34%	38%	245,317	10,800,000
COL	2007 – 2009	11,750	2,747,710	40%	43%	33%	415,230	4,552,508
CRI	2003 – 2009	2,671	2,847,481	33%	30%	45%	213,988	4,172,356
DOM	2003– 2008	2,794	1,520,003	43%	41%	38%	132,539	2,566,311
ECU	2003– 2009	3,006	3,933,504	53%	44%	38%	313,015	8,571,401
PER	2003 - 2009	6,355	3,243,954	40%	36%	44%	130,642	5,276,234
				Corr with entry:	**0.91**	**-0.71**		

Table 2: Statistics by Industry

			Annual average (2005 - 2006)			
	Number of firms	**Avg annual size**	**Entry rate**	**Exit rate**	**1y-Surv rate**	**Avg size ent.**
0 - Food and live animals	6,113	2,616,991	35%	31%	49%	253,155
1 - Beverages and tobacco	1,089	1,487,067	40%	37%	40%	96,527
2 - Crude materials, inedible, except fuels	3,942	5,493,654	42%	38%	41%	179,656
3 - Mineral fuels, lubricants and related materia	385	21,900,000	53%	49%	32%	1,238,507
4 - Animal and vegetable oils, fats and waxes	371	1,159,161	47%	43%	33%	190,362
5 - Chemicals and related products, n.e.s.	3,632	1,031,347	43%	39%	39%	109,438
6 - Manufactured goods classified chiefly by ma	8,095	3,050,242	47%	43%	39%	158,367
7 - Machinery and transport equipment	7,014	675,564	57%	51%	31%	93,841
8 - Miscellaneous manufactured articles	10,322	670,974	48%	44%	37%	66,373
9 - Commodities and transactions not classified	137	32,600,000	33%	27%	51%	1,350,237
			Corr with entry:	**0.99**	**-0.95**	**477,246**

* Regions included: Africa (MUS, SEN, TZA), Asia (KHM), Eastern Europe (ALB, BGR) and Latin America (CHL, CRI, DOM, ECU, PER)

Table 3: Country Pair Correlations

SITC -- 65 Sectors	# Firms	Tot. size	Entry	Exit	Survival
Percent Significant	98	24	67	62	40
Average Correlation	0.67	0.17	0.40	0.37	0.26

Table 4: Analysis of Variance

a) Industry, Country and Year Effects

Variable	Industry	Country	Year	Residual	Observations
Entry rate	24%	11%	0%	65%	3711
Exit rate	24%	12%	1%	63%	3835
Survival rate	13%	6%	2%	79%	3339
Number firms	28%	26%	0%	46%	4081
Total exports	11%	5%	0%	84%	4081

b) Industry-Year and Country-Year Effects

Variable	Industry-Year	Country-Year	Residual	Observations
Entry rate	30%	12%	58%	3654
Exit rate	31%	11%	58%	3775
Survival rate	24%	6%	70%	3287
Number firms	31%	23%	46%	4081
Total exports	14%	5%	82%	4081

Table 5: Incumbent vs. Entrants and Survivors vs. Exiters

	Average Export Size (2007 - 2009)						
	at annual level	at transaction level					
	ALL	KEN	KHM	MUS	MWI	PER	TZA
Incumbents (I)	4,335,912	38,123	158,186	42,985	67,169	284,505	166,513
Entrants (E)	206,701	15,260	99,301	18,998	109,993	42,516	34,849
Survivors (S)	368,010	14,401	216,342	18,398	61,001	56,706	35,318
Exiters (X)	46,544	15,742	33,146	17,593	16,458	22,896	31,202
Percent of Sectors I>E	100%	89%	54%	72%	63%	89%	77%
Percent of Sectors S>X	95%	67%	58%	65%	62%	83%	56%

Table 6: Exit vs. Size

a) All Industries

	PROBIT			PROBIT		
	Exit	Exit	Exit	Exit	Exit	Exit
ln(average annual size)	-0.0183***			-0.0153***		
	[0.00141]			[0.00157]		
ln (average first transaction size)		-0.0143***			-0.0107***	
		[0.00181]			[0.00204]	
ln (average annual transaction size)			-0.0288***			-0.0287***
			[0.000529]			[0.000536]
Country controls	Yes	Yes	Yes			
Industry controls	Yes	Yes	Yes			
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	138,603	138,603	138,603	138,467	138,467	138,467
R-squared						

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

b) By type of Industry

	high	high	high	low	low	low
ln(average annual size)	-0.0238***			-0.00828***		
	[0.00199]			[0.00213]		
ln (average first transaction size)		-0.0185***			-0.00443*	
		[0.00257]			[0.00269]	
ln (average annual transaction size)			-0.0379***			-0.0213***
			[0.000827]			[0.000690]
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Year controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59,353	59,353	59,353	79,250	79,250	79,250
R-squared						

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Entry, Exit and Survival vs. Size

	Entry	Exit	Survival	Entry	Exit	Survival	Entry	Exit	Survival
Ln(average size of incumbent)	-0.138***	-0.140***	0.0771***	-0.123***	-0.127***	0.0989***	-0.122***	-0.127***	0.101***
	[0.0154]	[0.0146]	[0.0155]	[0.0153]	[0.0154]	[0.0185]	[0.0154]	[0.0154]	[0.0189]
Relative size entrant				0.204**	0.183**	0.304**	0.217**	0.188**	0.354***
				[0.0839]	[0.0877]	[0.124]	[0.0867]	[0.0881]	[0.125]
Ln(number of firms)							0.0165	0.00738	0.0599**
							[0.0259]	[0.0241]	[0.0250]
Observations	893	893	892	893	893	892	893	893	892

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Entry, Exit and Survival vs. Size - Robustness 1, Other Controls

	Entry	Exit	Survival	Entry	Exit	Entry	Exit	Survival
Ln(average size of incumbent)	-0.129***	-0.133***	0.105***	-0.0893***	-0.113***	-0.0913***	-0.0966***	0.0826***
	[0.0133]	[0.0139]	[0.0181]	[0.0183]	[0.0224]	[0.0129]	[0.0125]	[0.0162]
Relative size entrant	0.249***	0.187**	0.294**	0.0417	-0.159	0.200**	0.151	0.414***
	[0.0934]	[0.0829]	[0.116]	[0.194]	[0.190]	[0.0984]	[0.103]	[0.102]
Ln (industry's world demand)	0.0903***	0.0841***	-0.0571***					
	[0.0271]	[0.0200]	[0.0171]					
Industry's average annual growth	0.484	0.262	-0.452					
	[0.537]	[0.506]	[0.616]					
Ln (tariff)	-0.00843	-0.0305	-0.0452					
	[0.0560]	[0.0502]	[0.0606]					
Domestic Entry				-0.00194				
				[0.00220]				
Domestic Exit					-0.00396			
					[0.00243]			
Industry F.E.						Yes	Yes	Yes
Observations	871	883	882	268	268	893	893	892

All regressions include country fixed effects. Standard errors are clustered at the industry level
Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Entry, Exit and Survival vs. Size – Robustness 2, Transaction Data

	Entry	Exit	Survival	Entry	Exit	Survival
Ln(average incumbent's transaction size)	-0.0805***	-0.0964***	0.0705**	-0.0695***	-0.0858***	0.0595**
	[0.0265]	[0.0309]	[0.0304]	[0.0248]	[0.0290]	[0.0294]
Relative size entrant				0.100**	0.0980**	-0.103**
				[0.0469]	[0.0486]	[0.0436]
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	559	558	556	559	558	556

Clustered standard errors by industry in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Sensitivity of Size on Entry rate with Higher Entry Cost

	Entry	Exit	Survival
HighCost*ln(size incumb)	-0.0476***	-0.0393**	-0.0053
	[0.0168]	[0.0194]	[0.0266]
ln(size of incumbent)	-0.0716***	-0.0896***	0.0557***
	[0.0127]	[0.0158]	[0.0180]
Observations	937	937	934

Country and industry fixed effects included. Standard errors in brackets.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$