Export Failure and Its Consequences: Evidence from Colombian Exporters

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Abstract

Exporters pay high fixed costs to enter foreign markets, yet the majority will not export beyond one year. What happens to these exporters after they fail abroad? For these firms, exporting likely resulted in heavy profit losses. Despite this, the trade literature largely ignores export failure and views exporting as a simple cost-benefit analysis based on foreign profits and trade costs. This rationale ignores the differential effect export failure may have on financially-constrained firms. I develop a heterogeneous-firm model with financial constraints and marketing costs to show how export failure can have the following effects: 1) make the liquidity constraint more likely to bind, 2) force financially-constrained firms to limit marketing expenditure and, hence, decrease domestic sales, and 3) induce some firms to default. I built a Colombian dataset that merges firm-level trade and financial data to test the propositions of the model. I find evidence that export failure has a differential impact on financially-constrained firms. After exporting, financially constrained unsuccessful exporters have a worse cash flow to total assets ratio, lower domestic revenue, slower domestic revenue growth and a higher probability of going out of business. The findings are robust to 1) comparisons with similar successful exporters and even non-exporters, and 2) an instrumental variable approach.

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I Introduction

Exporting allows firms to reach more consumers, potentially earn higher profits, and diversify against risk in the home market. Yet few firms export (Bernard and Jensen, 2004; Brooks, 2006). While several factors affect the costs and benefits of exporting, fixed export costs are particularly important in limiting international trade. These costs are estimated to be around half a million US dollars for a single firm in Latin America (Das, Roberts, and Tybout, 2007; Morales, Sheu, and Zahler, 2011), and often exceed export revenue in the first years of exporting.[1] In Colombia, for example, foreign revenue for first-time exporters is about US $200,000 on average and US $13,000 for the median firm in the 1996–2010 period. Since the majority of firms do not export beyond one year (Eaton, Eslava, Kugler, and Tybout, 2007), it is likely exporting resulted in profit losses for unsuccessful exporters.

What happens to those firms that try to export but fail? The trade literature often views exporting as a simple exercise based on a cost-benefit analysis of foreign profits, where the most productive firms export and there is no uncertainty in export success. And, from this perspective, there is no additional cost or benefit to export failure. However, export failure can have an effect on domestic production: it can be positive if firms learn from exporting, or negative if export failure has a negative feedback effect. There are economic reasons to believe that for some firms the negative effect dominates. Firms tend to rely more on external financing for export sales than for domestic sales (Amiti and Weinstein, 2011), so an unsuccessful exporter cannot simply refocus its resources towards domestic production and ignore foreign losses. Moreover, a firm's financial constraint might tighten due to the addition of export debt but little or no foreign revenue. A tightened financial constraint may mean fewer financing options for domestic operations, limiting hiring, marketing, capital investments, and even operating cash flow. This differential effect on financially-constrained firms means that the negative consequences of export failure, not just the probability of export failure, lower expected returns from exporting.

In this paper, I examine export failure. I develop a partial-equilibrium model that explains how a failed export attempt when accompanied with financial frictions can have a negative feedback on existing domestic operations. The model with heterogeneous firms shows that there exists a set of exporters for which export failure can have lasting negative consequences, including firm death. In addition, I find empirical support for this model. Using Colombian firm-level data and two identification techniques (difference-in-difference and instrumental variable methods), I show that export failure is indeed associated with reduced economic performance in the domestic market. I find that financially-constrained unsuccessful exporters have a higher probability of default after exporting, and those that survive have lower revenue and lower revenue growth. The effect, just as expected from the theoretical model, is robust to comparisons with similar successful exporters and even non-exporters. To my knowledge, I am the first to focus on failed exporters, provide stylized facts about these firms, and link export failure with poor domestic market performance.

[1] Export revenue tends to be small for first time exporters (Rauch and Watson, 2003; Esteve-Pérez, Mánez-Castillejo, Rochina-Barrachina, and Sanchis-Llopis, 2007).

The theoretical model builds the intuition for the empirical analysis. Since I am interested in the ex post effects of entering a foreign market, I model the firm's profit-maximization problem after export failure has been determined.[2] The model focuses on failed exporters, but also compares these firms with successful exporters and non-exporters; successful exporters and non-exporting firms provide counterfactuals for the failed exporters. Exporting has a differential impact on domestic operations because of financing needs and because of the existence of financial frictions. I assume firms borrow twice to pay upfront costs: the first loan pays for the export fixed cost and the second pays for domestic operations (marketing and upfront labor costs). Firms use their production-entry expenditure as collateral for the loans; this collateral is an asset necessary for production. I follow Manova (2013) in modeling financial frictions and Arkolakis (2010) in modeling marketing costs. To these I add an element of uncertainty in export success. Uncertainty is resolved after paying a search fee (an export fixed costs); the search fee gives the firm a chance to randomly match with a foreign distributor. Since a foreign distributor is necessary to sell any quantity in a foreign country, export failure takes place when a firm is unable to find a suitable match. The probability of export failure is known and exogenous to the model, therefore similar-productivity firms may differ in export success. Furthermore, since export failure results in new debt but no additional revenue, it tightens the liquidity constraint and diminishes the maximum amount firms can borrow to pay for domestic operations. In the model, I demonstrate how small and medium-sized firms can become financially constrained, decrease domestic sales, or even default because of a failed export attempt.

I test the model empirically and provide robust evidence that a failed exporting attempt has a negative impact on a firm's domestic market performance. A firm may even pay the ultimate price and go out of business because of its failed export attempt. Specifically, export failure results in worse cash flow to total assets, lower domestic revenue, lower domestic revenue growth, and a higher probability of going out of business. The association is strong even when comparing unsuccessful exporters with matched non-exporters and successful exporters.To address additional endogeneity concerns, I follow Hummels, Jørgensen, Munch, and Xiang (2014) and Aghion, Bergeaud, Lequien, and Melitz (2018) to instrument for export success based on plausibly exogenous market changes at the product level in foreign markets. The instrument contains rich variation across products and destinations, so its impact on a firm varies considerably.

The work in this paper complements various strands of the literature. It contributes to the firm heterogeneity literature by providing a better understanding of exporting costs, and thus of the firm export-entry decision.[3] This paper also contributes to the literature quantifying export costs. Das et al. (2007) and Morales et al. (2011) calculate a dollar amount to export fixed costs, and Smeets, Creusen, Lejour, and Kox (2010) quantify how a home-country's institutions can effect these costs. These studies differ from my work in that I focus on the prolonged costs—measured by the loss of domestic revenue and increased probability of going out of business—associated with

[2]In the ex-ante export-entry decision, both the cost of export failure and the probability of export failure lower expected returns from exporting and lead to fewer firms exporting.

[3]For a sample of the heterogeneous literature see Melitz (2003); Verhoogen (2008); Melitz and Ottaviano (2008); Bernard and Jensen (2004); Bernard, Jensen, Redding, and Schott (2007); Bernard, Redding, and Schott (2011); Helpman, Melitz, and Yeaple (2004).

export failure. Integrating the costs found in this paper into estimates of fixed costs may explain why the estimated fixed export costs are so high.

This paper also contributes to the literature on export survival.[4] The export survival literature includes studies using bilateral trade-flow data (Nicita, Shirotori, and Klok, 2013; Besedeš and Prusa, 2011, 2006a,b) and firm-level data (Stirbat, Record, and Nghardsaysone, 2013; Cadot, Iacovone, Pierola, and Rauch, 2013; Esteve-Pérez et al., 2007; Tovar and Martínez, 2011; Albornoz, Calvo Pardo, Corcos, and Ornelas, 2012). The focus of the existing literature is on understanding export survival, rather than understanding the consequences of export failure. Albornoz et al. (2012) develop a model that explains why firms have low export survival; in their model a firm can only infer its profitability abroad after exporting. In their model there are no consequences to export failure. Besedeš and Prusa (2011) show that differences in export survival at the country level explain differences in long-run export performance. I construct a model and implement an empirical strategy using firm-level data that directly links export failure and firm performance in the domestic market. Thus, my work identifies a channel through which firm export survival can have welfare effects at the national level.

More generally, this paper contributes to the literature on financial frictions and international trade. This literature explains how financial frictions affect a firm's decision to enter a foreign market. Manova (2013), Feenstra, Li, and Yu (2013), and Chaney (2013) identify a mechanism by which financial frictions can affect trade. Manova (2013) shows how financial frictions can affect both which firms export and how much they export. Feenstra et al. (2013) find that banks impose more stringent credit constraints on exporting firms, when compared with non-exporting firms. Antunes, Opromolla, and Russ (2014) examine the riskiness involved in financing exporting firms. They find that exporters, compared with non-exporters, are less likely to go out of business and, conditional on going out of business, more likely to default. The export failure results found in my paper may explain another reason exporters are more likely to default.

Finally, this paper adds to the literature on linkages between domestic and export markets. Ahn and McQuoid (2013) find that export and domestic revenue are substitutes. They find that capacity-constrained firms lower domestic sales when experiencing a positive export shock. McQuoid and Rubini (2014) differentiate between successful and unsuccessful exporters and find that "transitory" exporters have a larger drop in sales than "perennial" exporters in the domestic market when exporting. They focus on the immediate, short-run opportunity costs of exporting. I add to this literature by showing that this linkage does not end when a firm stops exporting; I show that the effect is prolonged and larger when an unsuccessful exporter is financially constrained. Rho and Rodrigue (2010) find that exporters have slower domestic revenue growth than non-exporting firms. They argue that previous models overestimate the sized of fixed export costs. My work differs in that I focus on the prolong effects on financially-constrained unsuccessful exporters, while they study the linkages for continuous exporters. Lastly, other papers identify trade-offs between the home and foreign market due to a firm's investment decision (Spearot, 2013), entry and exit decision

[4] A related field is work on firm's and entrepreneur's overall success. See Ucbasaran, Shepherd, Lockett, and Lyon (2013) for a summary of the literature.

(Blum, Claro, and Horstmann, 2013), and pricing decision (Soderbery, 2014).

The rest of the paper is organized as follows. Section II introduces a partial-equilibrium model, demonstrating how export failure can have repercussions in the home market. Section III describes the data and provides stylized facts about new exporters. Section IV implements the identification strategy and provides robustness checks. Section V concludes.

II A Model with Export Failure, Marketing Costs, and Financial Frictions

I start by developing a simple two-country, heterogenious-firm model to demonstrate how adding an element of uncertainty in export success links the export success outcome to the domestic market performance. The model identifies three testable predictions for unsuccessful exporters: export failure results in 1) a tighter financial constraint, 2) lower domestic revenue, and 3) higher probability of default.

II.1 Consumers

Consumers have constant elasticity of substitution (CES) preferences across varieties in each country (h and f). Utility for consumers is specified according to the following form:

$$U = \left(\int_{i \epsilon \Omega} c_i^{\rho} di \right)^{\frac{1}{\rho}}$$

Here, Ω is the mass of available varieties and c_i is the consumption of variety i. Since each firm produces only one product, i indexes for both the product and the firm. Goods are substitutes, which implies that $0 < \rho < 1$ and that the elasticity of substitution between two goods is given by $\sigma = \frac{1}{1-\rho} > 1$. Individuals maximize utility subject to a revenue constraint: $\int_{i \epsilon \Omega} p_i c_i di = Y$. Optimal consumption for an individual who buys variety i is given by $c_i = A p_i^{-\sigma}$, where $A = Y P^{\sigma - 1}$ is the market demand index that depends on spending (Y) and aggregate prices (P). Total consumption of variety i in each country is given by $q_i = L_i c_i = L_i A p_i^{-\sigma}$, where L_i is the number of individuals in a given country who buy variety i. L_i is endogenously determined by a firm's marketing expenditure.

II.2 Firms

Setup of the model

Firm pay a fixed entry fee, f_e, to enter the home market. The fee is a tangible asset a firm buys that can also be used as collateral. After paying f_e, the firm then draws a unit labor requirement

coefficient, $1/\phi_i$, from a known distribution $G(\phi_i)$. Upon receiving its productivity draw, the firm decides whether or not to produce; if producing, firms must additionally pay an overhead labor cost, f_d. All firms must also market their products to consumers; marketing costs, $F(L_i)$, determine the number of individuals a firm reaches. I assume marketing has increasing marginal costs, firms only use domestic labor in marketing, domestic wages are normalized to one, and all fees/costs are in terms of labor.

After entering the domestic market, firms must decide whether or not to export. In order to export a firm must pay an export entry fee, f_x, and identify a foreign distributor/partner. A share of firms (γ) are able to identify a foreign distributor and the rest $(1-\gamma)$ are not; a foreign distributor is necessary to sell any quantity abroad. For convenience, I assume that unsuccessful exporters do not gain any revenue from exporting.[5] To abstract from the export-entry decision and instead focus on the decision after export success has been determined, I assume that γ is determined outside of the model. This is a strong assumption as studies have found that more productive firms have higher export survival rates and some firms upgrade before exporting, increasing the probability of export survival (see Bustos, 2011). However, this assumption is not a concern here for several reasons: 1) for the conclusions to hold, we simply need similar productivity firms to differ in export success, 2) upgrading to improve export success tends to takes place on the upper end of the distribution, not at the productivity levels that are most adversely impacted by export failure, and 3) I clearly treat export failure as edogenous in the empirics.

Firms borrow to pay exporting fixed costs, f_x, overhead labor costs, f_d, and marketing costs, $F(L_i)$. As in Manova (2013), I assume that firms cannot use profits from a previous period or other savings to pay for these costs. For convenience, I also assume that all firms borrow the full amount of these costs; for the conclusions of the model to hold, firms simply need to pay a percentage of the fixed costs and upfront marketing costs with outside capital. Firms borrow in two installments: 1) to pay for the fixed costs, f_x and f_d, and 2) to pay for the marketing expenditure, $F(L_i)$. Note that spending on marketing is necessary to sell any quantity. Thus, firms able to borrow the first loan but not the second, will not be able to produce. Additionally, firms unable to repay their first loan, will lose their collateral, which must be replaced to produce in the future.

Financial frictions exist because creditors cannot collect all debts. In the model, creditors collect debt from a share (λ) of firms. As in Manova (2013), λ is the probability of default and is exogenous to the model. Endogenous default would reinforce the findings of this model as borrowing becomes more difficult and more costly for the cutoff firms.

Firm maximization problem after export success has been determined

As the focus of the paper is on the effects of export failure and as the model purposely abstract from the entry decision, I focus on the model predictions after export success has been determined. In this

[5] The conclusions will hold as long as unsuccessful exporters lose profits from exporting. As mentioned in the introduction, this is likely to be the case for most new exporters.

setup there will be three types of firms in the market: successful exporters, unsuccessful exporters, and non-exporters. *Successful exporters* supply two markets (home and domestic); *unsuccessful exporters* only supply the domestic market and have additional debt from their export attempt; and *non-exporters* also only supply the domestic market but have no export debt. I focus here on the unsuccessful exporter's outcome and I compare it with that of similar productivity non-exporters and successful exporters.

For unsuccessful exporter i, the maximization problem after the export attempt is as follows:

$$E\pi(\phi_i) = \max_{p_i, q_i, L_i} \left\{ p_i q_i - \frac{q_i}{\phi_i} - \lambda B_i - (1-\lambda) f_e \right\} \tag{1}$$

Subject to

$$q_i = L_i A p_i^{-\sigma} \tag{2}$$

$$F(L_i) = L_i^{\beta} \tag{3}$$

$$p_i q_i - \frac{q_i}{\phi_i} \geq B_i \tag{4}$$

$$\lambda B_i + (1-\lambda) f_e \geq f_x + f_d + F(L_i) \tag{5}$$

Equation (1) is the profit maximization problem for firm i. Equation (2) is total demand for the variety produce by firm i. Equation (3) is the marketing expenditure, the amount of labor required to reach L_i consumers. As in Arkolakis (2010), I assume $\beta > 1$ to allow for increasing marginal costs to reaching consumers. Equation (4) is the firm's liquidity constraint; net revenues must be larger than or equal to the loan repayment, B_i. The constraint binds for low productivity firms because less productive firms earn lower revenues and thus have lower repayment capabilities. Equation (5) is the risk-neutral, creditor's constraint; creditors fund a firm if expected net returns from the loan are greater than their outside option. Assuming perfect competition in the credit markets and an outside option normalized to zero, this constraint holds with equality.

II.3 Three propositions from the Model

Credit-constrained firm threshold

All firms set a constant mark-up ($\mu = \frac{\sigma}{\sigma-1}$) above marginal cost ($\frac{1}{\phi_i}$) and set prices as follows: $p_i^* = \frac{\mu}{\phi_i}$. Note that this pricing decision is not affected by the number of consumers reached by a firm (L_i). The profit maximizing L_i, in turn, is given by the following: $L_i^* = \left(\frac{A}{\sigma\beta}\right)^{\frac{1}{\beta-1}} \left(\frac{\mu}{\phi_i}\right)^{\frac{1-\sigma}{\beta-1}}$. L_i^* increases with productivity, ϕ_i, since $\frac{\partial L_i^*}{\partial \phi_i} > 0$. See Appendix A.2.a for details.

For a financially constrained firm, Equation (4) binds when setting price and marketing levels equal to the profit-maximizing p_i and L_i. For the firm at the constrained unconstrained threshold,

Equation (4) binds and yet the firm still chooses p_i^* and L_i^*. With this we can solves for the unconstrained firm threshold for non-exporters (ϕ_C^{dom}), unsuccessful exporters (ϕ_C^{fail}), and successful exporters (ϕ_C^{succ}).

Proposition 1: Some successful and unsuccessful exporters become liquidity constrained as a result of exporting. For similar productivity firms, unsuccessful exporters are more likely to become liquidity constrained than successful exporters.

To prove this proposition, I compare the unconstrained firm threshold for both successful and unsuccessful exporters with non-exporters (ϕ_C^{dom} vs ϕ_C^{fail}, and ϕ_C^{dom} vs ϕ_C^{succ}), and to prove the second part I compare this threshold firm for similar productivity successful and unsuccessful exporters. For successful exporters, this outcome depends on the size of the foreign market; I will assume the exporters enters a market similar to that of the home market. In Appendix A.2.b, I show that $\phi_C^{dom} < \phi_C^{fail}$, and $\phi_C^{dom} < \phi_C^{succ}$; that is, the unconstrained firm threshold is higher for both successful and unsuccessful exporters than non-exporters. I also show that the threshold will be even higher for unsuccessful exporters than successful exporters, that is $\phi_C^{succ} < \phi_C^{fail}$; This means that compared with successful exporters, more unsuccessful exporters will be classified as financially constrained.

Credit-constrained firm marketing decision and revenue

Financially constrained firms are unable to get their desired financing and reduce their need for financing by lowering the number of consumers reached. Reaching more consumers requires more financing, $\frac{\partial F(L_I)}{\partial L_i} = \beta L_i^{\beta-1}$, which increases the repayment necessary to meet creditors' demands, $\frac{\partial B_i}{\partial L_i} = \frac{\beta L_i^{\beta-1}}{\lambda}$.[6] An unconstrained risk-neutral firm discounts the repayment by λ. A financially constrained firm, on the other hand, is unable to do so because of the liquidity constraint, and sets L_i below L_i^*. Since deviation from optimum L_i lowers profits, the firm deviates as little as possible to ensure that the creditors break even. Appendix A.2.c solves for the credit-constrained firm's marketing decision for non-exporters, unsuccessful exporters, and successful exporters. In all cases, L_i is increasing in productivity, $\frac{\partial L_i}{\partial \phi_i} > 0$. While we can't solve for the L_i chosen by financially constrained firms, we can solve for the lower threshold for L_i: $L_i^C = \lambda^{\frac{1}{\beta-1}} \left(\frac{A}{\sigma\beta}\right)^{\frac{1}{\beta-1}} \left(\frac{\mu}{\phi_i}\right)^{\frac{1-\sigma}{\beta-1}}$ and $L_i^C = \lambda^{\frac{1}{\beta-1}} L_i^*$. Since $L_i^C < L_i^*$, financially constrained firms choose an L_i that lies on or between these two values. Additionally, since domestic revenue (v_i) for all firms is $p_i q_i = L_i A \left(\frac{\mu}{\phi_i}\right)^{1-\sigma}$, we can also calculate the revenue for financially unconstrained firms (v_i^*) and the lower-bound domestic revenue (v_i^C) for all firms (See Appendix A.2.c). The lower bound does not depend on export success, but it does depend on the productivity draw.

Proposition 2: Some financially constrained firms, regardless of their success abroad, have lower domestic revenues as a results of exporting. For similar productivity firms, the decrease in

[6] These two equations only equal when there are no financial frictions ($\lambda = 1$).

domestic revenue is greater for financially constrained unsuccessful exporters than for successful ones.

To prove this proposition, first note that anything that lowers L_i also lowers revenue. In Appendix A.2.d, I show that liquidity constrained firms, regardless of their success abroad, reach fewer consumers in the domestic market ($L^{dom} > L^{succ}, L^{fail}$), and hence also have lower domestic revenue as a results of exporting. Additionally, as seen in the Appendix, after controlling for firm productivity, the decreases in L_i and v_i are greater for financially constrained unsuccessful exporters than for financially constrained successful ones ($L^{succ} > L^{fail}$).

Firm production threshold

Some potentially profitable firms stop producing. Firms with productivity below ϕ_i^0 do not produce because, even if they give all profits to the creditor, the creditor still does not break even. The cutoff is defined by the constrained firm, ϕ_i^0, whose L_i choice equals L_i^C. I calculate the production threshold for non-exporters (ϕ_0^{dom}), unsuccessful exporters (ϕ_0^{fail}), and successful exporters (ϕ_0^{succ}) in Appendix A.2.e.

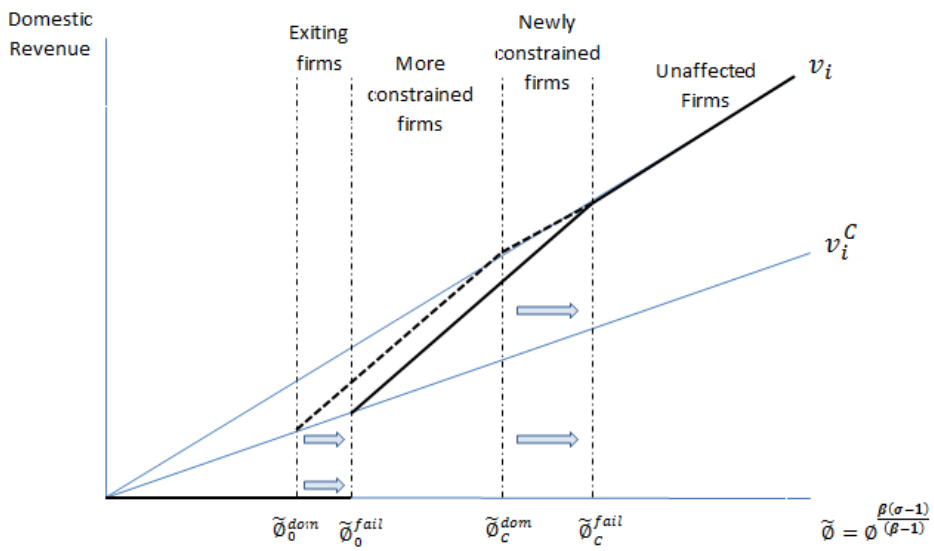
Proposition 3: Some unsuccessful exporters are unable to borrow and stop production because of exporting. Unsuccessful exporters are also more likely to fail in the domestic market than successful exporters.

In Appendix A.2.f I show that the production cutoff is higher for unsuccessful exporters than for non-exporters ($\phi_0^{fail} > \phi_0^{dom}$) and that this cutoff is also higher than that of unsucessful exporters ($\phi_0^{fail} > \phi_0^{succ}$).

II.4 Discussion

The model shows that underlying productivity differences result in lower-productivity exporters being financially constrained. Since there is also an idiosyncratic probability of export success, similar firms enter the export market but differ in success. Specifically, $(1-\gamma)$ share of these firms fail and must repay the export fixed cost using only domestic profits, and γ succeed and pay the cost with domestic and foreign profits. Exporting failure, thus, deteriorates a firm's financial health and this can impact the domestic market performance of financially constrained firms. In the model, export failure leads low-productivity, unsuccessful exporters to 1) become financially constrained, 2) have lower domestic revenue, and 3) exit the domestic market. Higher productivity exporters, given the distance from their financial constraint, can attempt to export without substantial negative consequences to failure. Figure 1 illustrates the consequences of export failure in terms of domestic revenue. In the figure, we see that unsuccessful exporters can be grouped into four categories: 1) unaffected firms, 2) newly constrained firms, 3) more constrained firms, and 4) exiting firms. These theoretical outcomes are the basis for my empirical work.

Figure 1: Unsuccessful exporters: before and after export failure



Note: The top line, v_i, represents the optimal domestic revenue as a function of firm productivity and the bottom line, v_i^C, represents the lower bound on domestic revenue as a function of a transformation of firm productivity. The figure shows the constrained cutoff ($\tilde{\phi}_C$) and the production cutoff ($\tilde{\phi}_0$) for unsuccessful exporters, $fail$, and non-exporters, dom.

III Data Description and Descriptive Evidence

In this section, I provide descriptive evidence of the link between export failure and domestic market performance. To analyze this link, I build a dataset using Colombian firm-level data. Using Colombian data to identify this connection is ideal for several reasons: 1) we can merge firm-level trade data with domestic firm-level financial data, 2) we can create a fairly long panel (16 years) and can observe a firm's behavior several years before and after exporting, and 3) firms in developing countries have a higher probability of export failure (see Besedeš and Prusa 2011), and the consequence associated with export failure may be felt more acutely in countries like Colombia.

III.1 Data sources and sample

I use two data sources in creating my dataset: 1) Colombian National Directorate of Taxes and Customs (DIAN) and 2) Sistema de Informacion y Reporte Empresarial (SIREM). DIAN reports firm-level customs data for the 1994–2011 period. This is the same source used in Eaton et al. (2007) and adds up to within one percent of UN COMTRADE exports. Each transaction includes a tax identifier (which is time-invariant), a product code, trading partner, and the free-on-board (FOB) export value in US dollars and Colombian pesos. I aggregate the transaction level data

to the annual level to match the level of aggregation of the financial data. Trade data should be aggregated to the annual level for two additional reasons: 1) seasonal fluctuations, and 2) there is evidence that firms trade infrequently to take advantage of economies of scale and to account for delivery lags (Alessandria, Kaboski, and Midrigan, 2010).

The other data source, SIREM, reports financial data for the 1995–2011 period. This database is managed by Superintendencia de Sociedade, which is part of the Colombian Ministry of Commerce, Industry and Tourism. The database does not include the universe of firms, only those under the ministry's jurisdiction. However, these firms account for most of the value added in the real economy. According to SIREM, the data account for 95% of the GDP in the real economy and cover on average of 25,000 firms per year (see SIREM User Guide). The data include firms in the following categories: private limited companies, public limited companies, joint ventures, simple limited partnerships, limited joint-stock partnerships, foreign companies, and self-employed businesses.[7] For each firm, the database provides the tax identifier, firm name, sector, year, and various balance sheet variables (liabilities, assets, revenue, etc.) in Colombian pesos. The financial data are self-reported and must be provided annually by law. There is a possibility that a firm did not report their data because it did not have to (firms that are in the process of shutting down do not have to report financial information) or because the firm is breaking the law. In either case, if a firm does not report its financial data, I interpret this as representing a negative outcome and simply treat the firm as exiting the domestic market.

To build the data sample, I merge the SIREM and DIAN datasets using the year and tax identifiers and make some additional restrictions. From the DIAN data, I drop firms whose tax identifiers do not conform to the standard nine-digit number. Since new exporters are the focus of this paper, I also exclude firms that exported in 1994, the first year available for the trade data. From the SIREM data, I exclude firms that have missing financial data in any period between their first and last year of operation and firms with negative domestic revenue. From the merge dataset, I make an additional requirement that all firms have financial data for at least two consecutive years: a year before exporting and the year of exporting. I do this to estimate the change between the pre- and post-exporting periods in several domestic variables. I end up with 19,073 firm-year observations, with 1,696 individual firms: 920 successful exporters, and 776 unsuccessful exporters.

Variable definitions Four variables of interest come out of the model in Section II: 1) export success classification, 2) financially-constrained firms classification, 3) domestic survival classification, and 4) domestic revenue levels. A firm is an *unsuccessful exporter* if the firm exports, but fails to export beyond a 12-month period.[8] A firm is *financially constrained* if its ratio of cash flow from operations to total assets is less than the median for all new exporters at the time of first exporting. This ratio measures how well a company is able to generate cash from its assets. A smaller ratio implies that the firm will have less cash available for future expenditures, and thus will be more in

[7] See Table A.1 for a complete list of included and excluded firm types.

[8] A firm that exports in two calendar years but fewer than 12 months can still be classified as an unsuccessful exporter. I get similar results if I use the calender year to define export failure.

need of external financing. This measurement is widely use in the literature (Ahn and McQuoid, 2013; Whited and Wu, 2006; Kaplan and Zingales, 1997). As a robustness check, I use the median total assets as a measurement for the financial constraint. A firm "*survives*" in the domestic market if it operates on the last year of available data. Lastly,*Domestic Revenue* is the log of total revenue in Colombian pesos minus total exports.

Table 1: Summary Statistics

	Continuous	Successful	Unsuccessful	Non-exporters
Trade data				
Avg. Number of Exporters per Year	2,458	4,242	1,817	-
Share of Exporters	0.30	0.52	0.22	-
Share Export value	0.74	0.27	0.01	-
Share of New Exporters	-	0.36	0.64	-
Share New Export value	-	0.68	0.32	-
Financial Data				
Avg. Number of Firms per Year	1,887	1,964	706	10,803
Share of Firms	0.12	0.13	0.05	0.70
Revenue (1 billion COL Pesos)	49.3	26.6	14.9	6.0
Exports(1 billion COL Pesos)	11.3	3.8	0.1	-
Exports/Revenue	0.23	0.14	0.00	-

Note: Calculations based on data from the Colombian DIAN and SIREM databases.

III.2 Summary statistics

Table 1 provides the summary statistics. On average, in a given year, about nine thousand Colombian firms export: 2,458 are continuous exporters, 4,242 are successful exporters, and 1,817 are unsuccessful exporters. Continuous exporters, firms that exported in 1994, account for most of the export value (almost three fourths of all exports), successful exporters account for a bit over one fourth, and unsuccessful exporters account for the rest (less than one percent). In the same table, we can also see that ignoring unsuccessful exporters is unwise. The vast majority of *new* exporting firms are unsuccessful exporters; unsuccessful exporters account for almost two thirds of new exporters. While unsuccessful exporters tend to export less than their share of firms, they nonetheless represent about a third of the export value from *new* exporters.

The financial data, in Table 1, put the importance of exporters in context. The financial data cover over fifteen thousand firms per year on average: 70 percent are non-exporters, 12 percent are continuous exporters, 12 percent are successful exporters, and 5 percent are unsuccessful exporters. While 30 percent of firms export at least once, the number is likely inflated by the fact that this

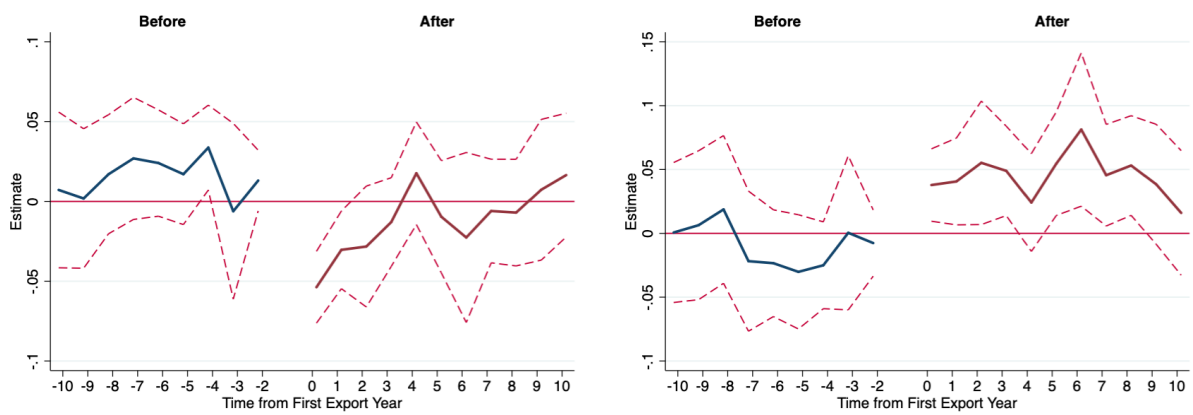
data is not a random sample of all Colombian firms, and the sample tends to include firms that are relatively large. Indeed, non-exporters on average have total sales equal to about 5 billion Colombian pesos (about US $2.5 million), continuous exporters average about 50 billion, successful exporters average about 27 billion, and unsuccessful average about 15 billion. Of this value, continuous exporters receive 23 percent from exporting, successful exporters receive 14 percent, and unsuccessful exporters receive less than 1 percent. The findings here confirm previously identified exporter characteristics: few firms export, only the most productive firms export, those that do export rely mostly on domestic revenue.[9]

III.3 Export Failure and Domestic-Market Performance

The dataset described above allows us to analyse the nexus between export failure and domestic market performance. In this section, we look at the data through the lens of the theoretical model developed in Section II. As the propositions pertain only to financially constrained firms, I will focus only on these firms in this section. I alleviate some of the concerns with these findings and provide more robust evidence in Section IV.

Figure 2: Cash Flow from Operations to Total Assets
(Financially Constrained Firms Only)

(a) Unsuccessful Exporters (b) Unsuccessful vs. Successful



Note: The estimates control for firm fixed effects and year fixed effects. The omitted group is financially unconstrained, unsuccessful exporters at time $t = -1$.

Export Failure and Financial Constraints: To show that exporting can lead both successful and unsuccessful exporters to become more financially constrained (Proposition 1), I look at a firm's

[9]See Díez, Mora, and Spearot (2018) or Bernard et al. (2007) for a summary of the data

ratio of cash flow from operations to total assets. A decrease of this ratio, as mentioned earlier, implies more need for external financing. Event-study Figure 2 shows how this ratio changes in periods before and after exporting relative to $t = -1$ (the year before exporting) for financially constrained firms, controlling for firm and year fixed effects.[10] For unsuccessful exporters, as seen in Figure 2a, the financial standing doesn't change much in the lead up to an export attempt. This finding contrasts with that of the after-exporting period, where this ratio deteriorates the first year a firm exports and stays below pre-exporting level for several years; the estimates are not statistically significant three years after the export attempt, implying that firms eventually recover. Figure 2b shows the difference between successful and unsuccessful exporters in terms of this financial health ratio. The differences between these firm types are not statistically significant before exporting, but successful exporters fare relatively better in the after exporting period. Thus, unsuccessful exporters become more financially constrained relative to successful firms after exporting, just as the theoretical model above predicts. Contrary to the predictions of the model, however, successful exporters are not more likely to become liquidity constrained after exporting. This is not concerning, as the predictions depended on the size of the export market, and the findings here may simply imply that for successful exporters, foreign profits are large enough to overcome the addition debt from exporting.

Export Failure and Domestic Revenue: The theoretical model postulated that domestic revenue will decrease after exporting for financially vulnerable firms and the drop will be more pronounced for unsuccessful exporters (Proposition 2). Event-study Figure 3 focuses on domestic revenue trends and how these trends change for firms that differ in export success. Figure 3a shows how the domestic revenue pattern changes before and after exporting for financially constrained, unsuccessful exporters. Before exporting, there doesn't seems to be much growth in domestic revenue in the lead up to the exporting decision. After the export attempt, however, domestic revenue decreases even after firms stop exporting; firms seem to stabilize, but not recover, after a few years of the export attempt. Figure 3b shows the difference in this variable between financially constrained successful and unsuccessful exporters. In the figure, we find no significant differences in the before exporting periods between soon-to-be successful and unsuccessful exporter, but the pattern changes greatly in the after exporting period. After exporting, we see that these successful exporters do much better than the unsuccessful ones.

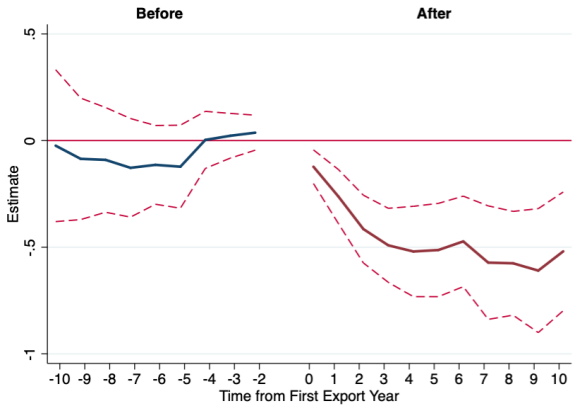
[10] The regression equation for the event study is the following:

$$Y_{i,t} = \alpha_i + \delta_t + \sum_{s=-T}^{-2} \beta_{1s} Before_{is} + \sum_{s=0}^{T} \beta_{1s} After_{is} + \sum_{s=-T}^{-2} \beta_{2s} Before_{is} \cdot Succ_i + \sum_{s=0}^{T} \beta_{2s} After_{is} \cdot Succ_i +$$
$$\sum_{s=-T}^{-2} \beta_{3s} Before_{is} \cdot NFV_i + \sum_{s=0}^{T} \beta_{3s} After_{is} \cdot NFV_i + \sum_{s=-T}^{-2} \beta_{4s} Before_{is} \cdot Succ_i \cdot NFV_i + \sum_{s=0}^{T} \beta_{4s} After_{is} \cdot Succ_i \cdot NFV_i + u_{i,t}$$

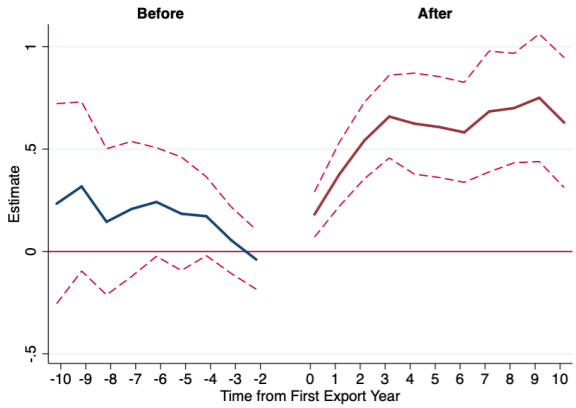
The regression includes firm fixed effects (α_i) and calendar year fixed effects (δ_t). NFV equals one for financially constrained firms and s is the time from first year exported. Figure 2a graphs estimates for β_{1s} and Figure 2b graphs β_{2s}.

Figure 3: Domestic Revenue
(Financially Constrained Firms Only)

(a) Unsuccessful Exporters



(b) Unsuccessful vs. Successful



Note: Domestic revenue is in logs. The estimates control for firm fixed effects and year fixed effects. The omitted group is financially constrained, unsuccessful exporters at time $t = -1$.

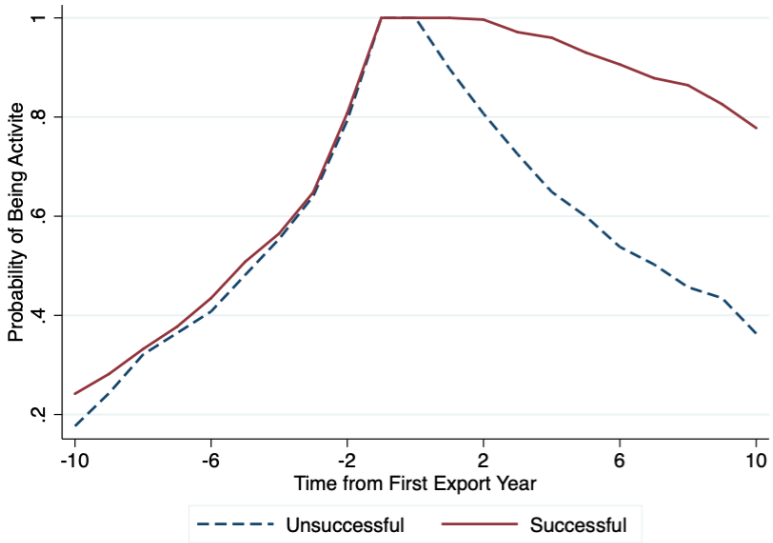
Export Failure and Domestic Production: Is it possible that domestic revenue drops enough for some firms that they go out of business as stipulated in the model (Proposition 3)? Figure 4 shows the share of financially-constrained firms by export success and exporting period averaged over the various cohorts.[11] In the pre-exporting period ($t < 0$), the figure shows the time from start of domestic production to start of exporting. In these periods there is no significant difference between successful and unsuccessful exporters; so there appears to be little difference in firm age at time of exporting for both firm types. However, the trend significantly differs for the two firm types in the after-exporting period ($t \geq 0$). Unsuccessful exporters are more likely to cease operating than successful ones, and the difference in survival rates increases over time. For example, about 90 percent of successful exporters are operating five years after first exporting, but only about 60 percent of unsuccessful exporters are still operating in the same period.

III.4 Discussion

The associations identified above make clear that there is an inverse relationship between export failure and domestic market performance for financially constrained firms. I took steps to eliminate several concerns in identifying a causal link in the relationship. First, the financial health and revenue estimates include firm fixed effects to account for omitted time-invariant variables: productivity, production sector, experience with the foreign markets (e.g. an importer), or access

[11] We cannot replicate the event-study figures above for this variable as it doesn't vary with time; a firm doesn't start and cease operations multiple times.

Figure 4: Firm Entry and Exit
(Financially Constrained Firms Only)



Note: The probability of being in the dataset is calculated by dividing, by firm type, the total number of firms in a given period by the total number of firms at $t = 0$. By design, the number of firms in the data do not change at $t = -2, -1, 0$.

to cheaper credit (e.g. a foreign invested enterprise), etc. Such characteristics help some firms increase the likelihood of success abroad and also help firms do better in the domestic market. Second, the estimates include year fixed effects since the association may be due to the timing in the sample, which includes a boom in the export markets as well as a deep world recession. Other similar concerns might include price changes, demand changes, or overall economic environment affecting all Colombian firms in a given year. Third, the event-study figures allowed us to eliminate another concerns: firms are in a downward trajectory in the domestic market and they export as a last resort. The event-study figures show no statistical difference in the pre-exporting period, but a significant difference in the after exporting periods. Finally, firms may export after a positive productivity shock that improves the domestic market performance. So firms may seem healthier before exporting because of the positive shock and simply revert to their average after exporting; exporting would be the result of the initial shock rather than exporting causing a shock to the domestic market. This concern is the reason why I focus on the difference between firm types rather than on the before and after effects of a particular firm type. While I question whether or not successful exporter are the appropriate comparison group, I find it encouraging that the event-study figures showed no statistical difference in the trends between firm types before exporting and that these trends differed significantly in the after exporting period.

While the steps above eliminate some concerns in identifying causal estimates between export

failure and domestic market performance, I still have two main concerns: 1) correct comparison group to account for firm trends and 2) firm-specific shocks. Going forward, I will take several steps to deal with these two concerns.

IV Consequences of Export Failure: The Empirics

In this section, I derive a baseline empirical equation based on the theoretical model, provide several comparison groups to control for firm trends, and also provide results using an instrumental variable approach to control for firm-specific shocks that correlate with export failure.

IV.1 Baseline empirical specification

To address the concerns mentioned in the previous section and to represent the theoretical model, I derive the following baseline empirical equation:

$$Y_{it} = \alpha_i + \delta_t + \beta_1 After_{it} + \beta_2 After_{it} \cdot Successful_i + u_{it} \tag{6}$$

In Equation (6), i indexes for the firm and t for the calendar year. Y_{it}, the outcome variable, is a measurement of economic performance in the domestic market; these outcome variables come from the predictions of the theoretical model. I include the following outcome variables: the ratio of *Cash Flow to Total Assets*$_{it}$, as a measure of the financial constraint; $log(Revenue_{it})$, the log of nominal domestic sales in Colombian Pesos by firm i in calendar year t; $\Delta log(Revenue_{it})$, the change in log domestic revenue for firm i between year t and $t-1$; and $Survive_i$, equals one if the firm does not cease operating during the period observed, and zero otherwise. α_i are the firm fixed effects and δ_t are calendar year fixed effects. $After_{it}$ equals one for all calendar years after a firm first exports, and zero otherwise. $Successful_i$ equals one for firms that export for more than one year, and zero otherwise. This variable drops out of the baseline equation when we include firm fixed effects. Since $After_{it} \cdot Successful_i$ captures the difference between successful and unsuccessful exporters in the after-exporting periods, β_2 tells us the difference between successful and unsuccessful exporters and, it is, thus, the estimate of interest when concerned about firm trends. Lastly, u_{it} is the error term. In the results, I will separate the estimates based on whether or not the firms are financially vulnerable. As the estimated differences between these two groups could be endogenous, the triple differences provide the strongest evidence in identifying a causal effect of export failure. While there may be reasons to expect differences between each of the comparison groups, it is harder to explain why these differences should change with exporting in the absence of firm-specific shocks that coincide with export attempts; we address firm-specific shocks shortly using an instrumental variable approach.

The model predicts that after exporting both successful and unsuccessful exporters that are financially constrained will have worse domestic market performance, $\beta_1 < 0$, but the decrease

should be less for successful exporters, $\beta_2 > 0$. Although not demonstrated in the model, in a dynamic setting, the effects of export failure should decrease with time; for example, over time, firms that manage to stay in business pay off export debt and can borrow at normal levels. To capture this, I split the after exporting period into three periods: short-run, medium-run, and long-run. I modify Equation (6) by splitting the $After_{it}$ dummy into these three post exporting periods:

$$\beta_1 After_{it} \rightarrow \beta_{11} After(t=0)_{it} + \beta_{12} After(t = 1 \ to \ 4)_{it} + \beta_{13} After(t \geq 5)_{it}$$

Here $After(t = 0)_{it}$ equals one the first year firms export, and zero otherwise; I refer to this period as the short run. I separate the short run effect since there might be an immediate trade-off between domestic and foreign sales due to capacity constraints, and this decrease is fundamentally different than decreases in future periods.[12] $After(t = 1 \ to \ 4)_{it}$ equals one for the next four years, and zero otherwise; I refer to this period as the medium run. The medium run is the period of interest as the consequences of export failure should be most acutely felt during this period and capacity constraints should have no impact on domestic sales during this period. $After(t \geq 5)_{it}$ equals one for the remaining periods, and zero otherwise; I refer to this period as the long run. Based on the model, I expect all of these estimates to be negative. However, as mentioned earlier, any negative association between export failure and domestic market performance should be much smaller in the long run.

Baseline estimates

The results for the baseline estimates will be divided into two sets depending on the outcome variables: 1) financial constraints, domestic sales, and domestic revenue growth are grouped together, and 2) the probability of staying in business is separate as this variable is fundamentally different than the other outcomes since its classification (firm survival) doesn't change with time.

In the baseline estimates (Table 2), we see that, regardless of the outcome variable, these finding are remarkably consistent: export failure leads to a worse domestic market performance. Exporting, for unsuccessful exporters, results in worse cash flow to total assets (column 1), less domestic sales (column 3), and lower domestic revenue growth (column 5). In all cases, we see that successful exporters experience a much smaller decrease, if at all, when compared with unsuccessful exporters. Furthermore, as predicted by the model, these outcomes are worse for financially vulnerable firms ($NFV = 1$ for firms that are NOT financially vulnerable). The cash flow to total assets (columns 2) decreases by 7% in short run before stabilizing at a decrease of 3%. Domestic revenue (columns 4) decreases by 15% at first which might be evidence of capacity constraints, but capacity constraints don't explain why domestic revenue continues to decrease by 44% in the medium run and 64% in the long run. Furthermore, domestic revenue growth (columns 6) even after controlling form

[12] As shown in McQuoid and Rubini (2014), continuous exporters experience less of a trade-off between the domestic market and the foreign market than do transitory exporters.

firm-specific trends, decreases at first (17%) and drops even more in the medium and long run (close to 24% and 19%, respectively). For the comparison estimates, I will focus on the medium run estimates as these results are most closely align with the predictions of the theoretical model in Section II.

When comparing financially constrained firms in the medium run, successful exporters have higher cash flow to total assets ratio (5%), higher domestic sales (45%), and higher growth rates (5%) after exporting than unsuccessful exporters. All of these estimates are statistically significant. When comparing only unsuccessful exporters in the same period, financially unconstrained firms have higher cash flow to total assets ratio (3%), higher domestic sales (45%), and higher growth rates (9%) after exporting than financially constrained firms. All of these estimates are also statistically significant. If $Successful$ and NFV capture characteristics specific to these variables and exporting is not a cause of poor domestic market performance, we would not expect the triple differences to be statistically significant. However, the triple differences in every case is large and statistically significant in the medium run. The difference grows for all categories in the medium run: higher cash flow to total assets ratio (-5%), higher domestic sales (-22%), and higher growth rates (-15%). A negative estimate implies both that 1) the difference, after exporting, between financially-constrained successful and unsuccessful exporters grows more than the difference for those firms that are not financially constrained, and 2) the difference between the two types of unsuccessful exporters grows more than the difference for those firms that are successful exporters.[13] These findings are consistent with the model since financially healthy firms, should not be affected by exporting, and the model predicts worse domestic outcome for financially vulnerable unsuccessful when compared with all other firm types.

[13]Note, additionally, that the estimates might be stronger if not for attrition. If I correct for attrition by including zero domestic revenue for firms that exit the domestic market, the long run differences increase further.

Table 2: Baseline Estimates: All Data

Dependent →	Cash Flow/Tot. Assets			Ln(Dom. Rev.)			ΔLn(Dom. Rev.)		
	(1)	(2)		(3)	(4)		(5)	(6)	
	Base	Base	Base*NFV	Base	Base	Base*NFV	Base	Base	Base*NFV
Year of exp	-0.01	-0.07***	0.12***	-0.03	-0.15***	0.24***	-0.10***	-0.17***	0.14**
	(0.01)	(0.01)	(0.02)	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.05)
After ($t = 1 - 4$)	-0.02***	-0.03***	0.03**	-0.22***	-0.44***	0.45***	-0.19***	-0.24***	0.09**
	(0.01)	(0.01)	(0.01)	(0.05)	(0.07)	(0.08)	(0.03)	(0.04)	(0.05)
After (5 or more)	-0.03**	-0.03**	-0.00	-0.44***	-0.64***	0.43***	-0.17***	-0.19***	0.03
	(0.01)	(0.01)	(0.02)	(0.08)	(0.10)	(0.15)	(0.04)	(0.04)	(0.06)
Successful*(Year of exp)	0.02**	0.05***	-0.05**	0.17***	0.12*	0.05	0.07*	0.15**	-0.17**
	(0.01)	(0.02)	(0.02)	(0.04)	(0.07)	(0.08)	(0.04)	(0.06)	(0.07)
Successful*After($t = 1 - 4$)	0.03***	0.05***	-0.05**	0.36***	0.45***	-0.22**	0.05*	0.13***	-0.15**
	(0.01)	(0.02)	(0.02)	(0.06)	(0.09)	(0.11)	(0.03)	(0.05)	(0.06)
Successful*After(5 or more)	0.03***	0.06***	-0.06**	0.50***	0.57***	-0.19	-0.03	-0.01	-0.02
	(0.01)	(0.02)	(0.02)	(0.09)	(0.12)	(0.17)	(0.03)	(0.05)	(0.07)
Firm and year fixed effects	Yes	Yes		Yes	Yes		Yes	Yes	
Number of observations	19,073	19073		18,711	18711		16,989	16989	
Number of clusters/groups	1,696	1,696		1,696	1696		1,695	1,695	
Adjusted R^2	0.006	0.019		0.264	0.271		0.034	0.035	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis; and Not Financially Constrained (NFV). I use the inverse hyperbolic sine transformation of Cash Flow/Total Assets to handle extreme values; winsorizing the data gives similar results.

The probability of staying in business is another, and perhaps more important, measurement of domestic market performance. The results measuring this probability underscore how the negative effects of exporting might be so large that they can lead to firms going out of business (see Table 3).[14] For these estimates, I modify the baseline equation to account that this variable does not vary with time, and use the following empirical equation:

$$Survive_i = \beta_1 Successful_i + \beta_2 Successful_i \cdot NFV + \beta_3 NFV + \Theta_i + u_i \tag{7}$$

Where NFV, as before, equals one if the firm is not financially constrained, and zero otherwise. Θ_i are variables controlling for individual characteristics. These variables include export value and various pre-exporting characteristics: short-term labor, investment, and debt; long-term labor, investment, and debt; and inventory, property, domestic revenue, intangibles, total assets, profits, and cash flow. I exclude most of these estimates from the results tables as most are not statistically significant. Nonetheless, the estimates in Table 3 shows that after controlling for these firm characteristics (column 2, 4, and 6) financially vulnerable successful exporters are still 10 percentage points more likely to stay in business than financially vulnerable unsuccessful exporters in the short run, 21% in the medium rum, and 5% in the long run. Financially unconstrained unsuccessful exporters are more likely to stay in business than their constrained counterparts, but these differences are not statistically significant when controlling for firm characteristics. This may not be surprising as we control for variables that explain this classification (eg. Total assets and cash flow). The triple difference, are before, are statistically significant in the short run (-4%) and in the medium run (-6%). Which is in line with the previous estimates and with the predictions of the model.

IV.2 Controlling for firm trends: domestic and successful exporters

I match unsuccessful exporters to both successful exporters and non-exporters to control for pre-exporting observables, and also to create alternative control groups. The variables used to match firms are the following: short-term labor, investment, and debt; long-term labor, investment, and debt; and inventory, property, domestic revenue, intangibles (intellectual property, patents, etc.), total assets, profits, and cash flow. Each of the variables is at the firm-year level and is transformed using an inverse hyperbolic sine transformation. In order to match these firms, I use nearest neighbor, propensity score matching (PSM); I perform 1-to-1 matching without replacement and impose a common support to find the match.[15] Since the ordering of the data might affect a firm's match, I randomize the data before matching.

I match non-exporters to an unsuccessful exporter based on pre-exporting variables and assign the "after-exporting" period based on the match; I force the match to be within the same start-up year and sector. The start-up year is based on when the firm first appeared in the SIREM dataset. The start-up sector is at the ISIC chapter level. Each non-exporter is assigned a pseudo exporting

[14] The estimates here are for a linear probability model. However, the estimates are robust to using a logarithmic transformation on the outcome variable.

[15] See Rosenbaum and Rubin (1983) for details.

Table 3: Exporting Failure Decreases Probability of Staying in Business

Dependent Var. ⇒	Survived SR		Survived MR		Survived LR	
	(1)	(2)	(3)	(4)	(5)	(6)
Successful	0.10***	0.10***	0.23***	0.21***	0.05*	0.05**
	(0.02)	(0.01)	(0.03)	(0.03)	(0.02)	(0.02)
Successful*NFV	-0.04**	-0.04**	-0.06*	-0.06*	0.02	0.02
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Not Fin. Vulnerable (NFV)	0.03*	0.02	0.05*	0.04	0.01	0.01
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
First Export Value$_{t=0}$		0.01**		0.03***		-0.01
		(0.00)		(0.01)		(0.01)
Avg. Long-Term Labor$_{t<0}$		0.00		0.01**		0.00
		(0.00)		(0.00)		(0.00)
Avg. Revenue$_{t<0}$		0.00		-0.01***		0.00
		(0.00)		(0.00)		(0.00)
Avg. Profits$_{t<0}$		0.00		0.00**		0.00
		(0.00)		(0.00)		(0.00)
Firm-Level Controls	No	Yes	No	Yes	No	Yes
Exp. Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,696	1,696	1,640	1,640	1,437	1,437
Adjusted R^2	0.066	0.069	0.133	0.149	0.123	0.124

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parenthesis. SR is one for firms that survived past the short run, MR is one for firms that survived past the medium run (excluding firms that exited in SR), and LR is one if the firm doesn't exit during the period of observation (excluding firms that exited in SR and MR). The regressions also control for short-term labor, investment, and debt; long-term labor, investment, and debt; and inventory, property, domestic revenue, intangibles, total assets, profits, and cash flow. All of these variables use inverse hyperbolic sine transformation.

cohort and can be compared with unsuccessful exporters in the pre- and post-"exporting" periods. Since the before-exporting period length differs greatly by firms, I create an algorithm that uses as much of the data as possible to match firms. Thus, unsuccessful exporters with a lot of data in the pre-exporting period were matched with firms having at least as much data. For example, an unsuccessful exporter with five years of pre-exporting data would match with a non-exporting firm with at least 6 years of data. This process ensures that non-exporters do not exit the domestic market before the pseudo exporting year.

I follow a similar procedure to match successful exporters with unsuccessful ones. However, I do not create an artificial after-exporting period for successful exporters as these firms already have an exporting cohort and I do not force the match to be within the same start up year. With the matched sample, the only observable difference with unsuccessful exporters is either the firm's exporting decision, in the case of non-exporters, or in the firm's export success, in the case of successful exporters. Once I have a match, I can then replicate the baseline estimation procedure with two additional control groups.

Table 4: Matched Estimates: All Data

Dependent →	Cashflow/Tot. Assets			Ln(Dom. Rev.)			ΔLn(Dom. Rev.)		
	(1)	(2)		(3)	(4)		(5)	(6)	
	Base	Base	Base*NFV	Base	Base	Base*NFV	Base	Base	Base*NFV
Year of Exp.	-0.01	-0.06***	0.12***	0.00	-0.12***	0.25***	-0.09***	-0.16***	0.14***
	(0.01)	(0.01)	(0.02)	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.05)
After ($t = 1 - 4$)	-0.02***	-0.03***	0.03**	-0.17***	-0.37***	0.42***	-0.18***	-0.22***	0.08*
	(0.01)	(0.01)	(0.01)	(0.05)	(0.07)	(0.08)	(0.03)	(0.04)	(0.05)
After (5 or more)	-0.03**	-0.03*	-0.00	-0.34***	-0.51***	0.38***	-0.15***	-0.17***	0.04
	(0.01)	(0.01)	(0.02)	(0.08)	(0.09)	(0.15)	(0.03)	(0.04)	(0.06)
Successful*Year of Exp.	0.03**	0.05***	-0.05**	0.18***	0.14**	0.03	0.06	0.14**	-0.16**
	(0.01)	(0.02)	(0.02)	(0.04)	(0.07)	(0.09)	(0.04)	(0.06)	(0.08)
Successful*After($t = 1 - 4$)	0.03***	0.06***	-0.05**	0.37***	0.44***	-0.19*	0.06*	0.13***	-0.13**
	(0.01)	(0.02)	(0.02)	(0.06)	(0.09)	(0.11)	(0.03)	(0.05)	(0.06)
Successful*After(5 or more)	0.04***	0.07***	-0.06**	0.50***	0.53***	-0.11	-0.02	0.01	-0.05
	(0.01)	(0.02)	(0.02)	(0.09)	(0.12)	(0.18)	(0.03)	(0.05)	(0.07)
Domestic*Year of Exp.	-0.01	0.05***	-0.12***	-0.10**	0.03	-0.28***	0.07*	0.17***	-0.22***
	(0.01)	(0.01)	(0.02)	(0.04)	(0.06)	(0.08)	(0.04)	(0.06)	(0.08)
Domestic*After($t = 1 - 4$)	-0.00	0.01	-0.02	0.01	0.23***	-0.45***	0.11***	0.16***	-0.12*
	(0.01)	(0.01)	(0.02)	(0.06)	(0.08)	(0.11)	(0.03)	(0.04)	(0.06)
Domestic*After(5 or more)	0.01	0.01	0.01	0.10	0.29**	-0.41**	0.10***	0.12**	-0.03
	(0.01)	(0.02)	(0.02)	(0.09)	(0.12)	(0.19)	(0.04)	(0.05)	(0.07)
Firm and year fixed effects	Yes	Yes		Yes	Yes		Yes	Yes	
Number of observations	24,164	24,164		23,562	23,562		21,237	21,237	
Number of clusters/group	2,295	2,295		2,280	2,280		2,276	2,276	
Adjusted R^2	0.007	0.016		0.228	0.233		0.029	0.029	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis; and Not Financially Constrained (NFV). I use the inverse hyperbolic sine transformation of Cash Flow/Total Assets to handle extreme values; winsorizing the data gives similar results.

Propensity score matching estimates

Table 4 shows that both successful exporters and non-exporters are, overall, better off than unsuccessful exporters, with successful exporters seeming to fare better.[16] The findings using the matched successful exporter group are fairly consistent with the baseline estimates as are the post-exporting estimates for unsuccessful exporters. Thus, in this section, I will focus on the difference between non-exporters and unsuccessful exporters. The estimated post-exporting difference between non-exporters and unsuccessful exporters, before separating financially vulnerable firms, vary depending on the outcome variable: there are no differences in cash flow to total assets (column 1); there is a short run difference for domestic sales, but no medium and long run effects (column 3); and there are significant difference in all periods for domestic revenue growth (column 5). However, once we calculate the differences between these outcomes for firms that differ in their financial constraint (columns 2, 4, and 6), we find that relative to financially constrained unsuccessful exporters have worse outcomes than non-exporters: 1) the drop in cash flow to total assets is not as great for financially constrained non-exporters in short run; 2) the drop in domestic revenue is much less for these non-exporters in the medium run (23%) and long run (29%); and 3) the drop in domestic revenue growth is less for these non-exporters in all periods (17%, 16%, and 12%, respectively). Finally, as before, the triple differences reinforce our findings, at least for some of our outcomes variables. Focusing on the medium run, we find negative triple differences between unsuccessful exporters and non-exporters for domestic revenue (-45%) and domestic revenue growth (-12%). A negative estimate implies both that the difference, after exporting, between financially-constrained non-exporters and unsuccessful exporters grows more than the difference for those firms that are not financially constrained, and it also implies that the difference between the two types of unsuccessful exporters grows more than the difference for those firms that are non-exporters exporters. To summarize, these estimates find some evidence that financially constrained, unsuccessful exporters are worse off in the domestic market when compared with firms that have similar pre-exporting trajectories.

The matched survival results (see Table 5) for the successful exporter comparison group are consistent with the previous findings: these firms are more likely to survive and the triple difference is negative and statistically significant. The finding for the non-exporting comparison group, while similar in sign, are not statistically significant. These findings imply that the decreases in domestic market performance, while still there and long lasting, may be smaller than those estimated in the baseline results.

[16] This ranking is not consistent with the theoretical model because I assume symmetrical countries. The ranking would be consistent if firms export to countries larger than Colombia; this is likely the case as the US is one of the primary export destinations for Colombian firms.

Table 5: Matched Estimates: Export Failure and the Probability of Staying in Business

Dependent Var. ⇒	Survived SR		Survived MR		Survived LR	
	(1)	(2)	(3)	(4)	(5)	(6)
Successful	0.11***	0.11***	0.23***	0.23***	0.05*	0.05**
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
SuccessfulxNFV	-0.04**	-0.04**	-0.06*	-0.07**	0.02	0.02
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Domestic	0.00	0.00	0.01	0.01	0.05**	0.04**
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
DomesticxNFV	-0.02	-0.02	0.00	0.01	-0.01	-0.01
	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)
NFV	0.03	0.02	0.05*	0.04	0.01	0.01
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
Firm-Level Controls	No	Yes	No	Yes	No	Yes
Exp. Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,280	2,278	2,163	2,162	1,836	1,835
Adjusted R^2	0.047	0.057	0.149	0.164	0.135	0.141

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parenthesis. SSR is one for firms that survived past the short run, MR is one for firms that survived past the medium run (excluding firms that exited in SR), and LR is one if the firm doesn't exit during the period of observation (excluding firms that exited in SR and MR). The regressions also control for short-term labor, investment, and debt; long-term labor, investment, and debt; and inventory, property, domestic revenue, intangibles, total assets, profits, and cashflow. All of these variables use inverse hyperbolic sine transformation.

IV.3 Export demand shock as an instrument for export success

Are unsuccessful exporters systematically different than our control groups even after controlling for both firm fixed effects and observable, pre-exporting characteristics? If so, using alternative control groups is insufficient in identifying the link between export failure and domestic market performance. To address this we will use an instrumental variable approach to deal with an endogenous outcome: export failure. Instrumenting for export success will allow me to robustly estimate how this variable affects the domestic market for all firms, for financially unconstrained firms, and for financially constrained firms. One drawback of this approach is that I am unable to test whether or not the differences between the two groups is statistically significant. Nonetheless, this strategy allows me to show that export failure has negative effects on a firm's domestic market performance; something that has important policy implications.

Market trend change abroad between the year a firm first exports and the following year is our instrument for export success. To calculate this change, we first define the market for any firm i in country h as a weighted average of total demand abroad (excluding demand from h country) in exported products:

$$WIM_t^{ih} = \sum_{f,p} S_{pf,t=0}^{ih}(imp_{pt}^f - imp_{pht}^f)$$

$S_{pf,t=0}^{ih}$ is the share of firm i's total exports in product p (HS-1996, six-digit product level) to country f when first exporting ($t = 0$); for all firms $\sum_{f,p} S_{pf,t=0}^{ih} = 1$. These weights are firm specific and do not vary; more importantly, defining the shares this way ensures that firm-specific WIM varies only when foreign countries change their demand for non-Colombian imports. The second term, $imp_{pt}^f - imp_{pht}^f$, defines non-Colombian imports: total imports of product p from all firms into country f (imp_{pt}^f) minus imports from Colombian firms (imp_{pht}^f). Thus, change in WIM from the year a firm first exports to the following year should effect whether a firm continues to supply the foreign market, but should not be correlated with domestic market performance in Colombia. To address the fact that firms may project changes based on past outcomes, the instrument is the change in past trends. This instrument has product, destination, and year variation.[17] Finally, I do not instrument for successful exporter directly, as it is absorbed by the firm fixed effects. Rather, I instrument for the interaction between successful exporter and the three after-exporting periods; that is, I instrument for the short-run, medium-run and long-run difference-in-difference variables. I instrument for these variables using the interactions between the three periods and the instrument for successful exporters.

To satisfy the exclusion restriction, the WIM trend shock must be exogenous to the firm and its initial exporting decisions, something that is likely to be the case for first time exporters. The exclusion restriction might nonetheless be violated if there is something about successful exporters that enables them to identify growth opportunities and also enables them to do better in the

[17] This instrument is similar to that used in Hummels et al. (2014) to explain a firm's offshoring decision and Aghion et al. (2018) to explain a firm's innovation decision. The key difference is that I focus on the percentage change and only at the time of entering the export market.

domestic market. Likewise, there are issues with the instrument if the world import market is correlated with the domestic market. Since I control for year fixed effect, this is only an issue if the shocks are industry specific. Finally, another issue not addressed by this instrument is that exporting might be associated with learning-by-doing, something that is disputed.

We can see in the first-stage regression results (Table 6) that the inclusion restriction is satisfied. The first stage regressions have high F-tests and show that export success is indeed correlated with world import market trend changes. The F test of excluded instruments for $After(t = 0) * Succ.$, $After(t = 1\ to\ 4) * Succ.$, and $After(t \geq 5) * Succ.$, are well over 30 in every case for all dependent variables. In the first-stage estimates, we also see that the instruments are positively correlated with export success and that the correlation decreases both in terms of size and significance for the long-run estimates.

Instrumental variable estimates

Table 7 shows the consequences of export failure using the instrumental variable approached described above. We start by calculating the estimates for both financially constrained and financially unconstrained firms as we did in the baseline estimates in Table 2, and focus on the medium and long run effects, ignoring short-run effects that may be biased by capacity constraints. In those periods, relative to the baseline estimates, export failure is associated with an even greater deterioration in domestic revenue and domestic revenue growth. More importantly, we find that successful exporters are relatively better off (the difference-in-difference estimates are positive and statistically significant). The ratio of cash flow to total assets estimates lose significance relative to the baseline estimates; the reason for this is that we find that the effect of export failure on this variable depends on whether or not the unsuccessful exporters are financially constrained. To see this, I re-run the estimates for all of these variables, but separating firms depending on the constrained classification. Running separate regressions allows me to show that there are consequences to export failure and that the estimates may differ by classification.

The IV estimates for domestic revenue and domestic revenue growth are similar in sign and significance between the two groups. However, as expected, the negative after-exporting outcomes are larger for financially constrained unsuccessful exporters, and the relative improvements are also larger for financially constrained successful exporters. While we can't test whether or not these differences are statistically significant, they do match the earlier findings. Finally, the estimates on the ratio of cash flow to total assets don't seem to have much of on impact for financially constrained unsuccessful exporters, but there is some positive association, at least in the short run, for financially unconstrained firms. Again, this may simply reinforce the following point: even if there are some negative effects of export failure for all firms, financially-constrained firms are more greatly impacted.

Table 6: First-Stage Regressions for Market Changes as a Instrument

Dependent Var. →	A(0)*Suc	A(1-4)*suc	A(≥5)*suc	A(0)*Suc	A(1-4)*suc	A(≥5)*suc	A(0)*Suc	A(1-4)*suc	A(≥5)*suc
Year of exp	0.560***	-0.00236	-0.0145***	0.560***	-0.00446	-0.0159***	0.567***	0.00433	-0.0195***
	(43.71)	(-0.87)	(-4.36)	(43.68)	(-1.56)	(-4.82)	(43.18)	(0.82)	(-3.98)
After (t=1 to 4)	-0.00699***	0.610***	-0.0198***	-0.00872***	0.613***	-0.0217***	-0.00304	0.614***	-0.0281***
	(-5.08)	(48.13)	(-4.24)	(-5.87)	(48.15)	(-4.68)	(-1.35)	(45.39)	(-4.25)
After (5 or more)	-0.0208***	-0.0800***	0.741***	-0.0230***	-0.0831***	0.746***	-0.0182***	-0.0913***	0.735***
	(-7.64)	(-8.65)	(46.00)	(-8.09)	(-8.68)	(45.95)	(-5.67)	(-8.84)	(41.57)
Year of exp*IV	0.00403**	0.0000154	0.000204	0.00403**	0.0000276	0.000219	0.00404**	0.0000787	0.000277
	(2.70)	(0.03)	(1.14)	(2.69)	(0.06)	(1.22)	(2.78)	(0.12)	(1.17)
After (t=1 to 4)*IV	0.000218*	0.00335***	0.0000732	0.000245*	0.00332***	0.0000662	0.000317*	0.00352***	0.000143
	(2.16)	(3.37)	(0.39)	(2.38)	(3.33)	(0.35)	(2.37)	(4.00)	(0.57)
After (5 or more)*IV	0.000357***	0.000671*	0.00263***	0.000387***	0.000717**	0.00255***	0.000429***	0.000884**	0.00262***
	(3.69)	(2.47)	(8.81)	(4.03)	(2.64)	(8.55)	(4.50)	(3.26)	(9.68)
Number of Observations	16,834	16,834	16,834	16,497	16,497	16,497	14,963	14,963	14,963
F test	38.73	35.78	56.92	40.53	35.48	54.19	48.67	40.63	57.88
Second Stage →	Cash Flow to Total Assets			Domestic Revenue			Domestic Revenue Growth		

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; All regression include firm fixed effects and year fixed effects. Robust standard errors, clustered at the firm level, in parenthesis. The F test is for excluded instruments.

Table 7: IV Estimates

	All Firms			Financially Constrained			Financially Unonstrained		
Dep. Var ⇒	CF/TA	Dom Rev	Rev Growth	CF/TA	Dom Rev	Rev Growth	CF/TA	Dom Rev	Rev Growth
Year of exp	-0.02	-0.27	-0.03	0.01	-0.18	-0.38***	0.12***	0.05	0.03
	(0.07)	(0.18)	(0.09)	(0.02)	(0.12)	(0.13)	(0.03)	(0.12)	(0.08)
After (t=1 to 4)	0.07*	-0.82***	-0.36***	-0.02	-0.61***	-0.41***	0.07**	-0.44***	-0.39***
	(0.04)	(0.14)	(0.07)	(0.04)	(0.13)	(0.14)	(0.03)	(0.13)	(0.08)
After (5 or more)	0.03	-2.14***	-0.92***	-0.01	-3.02***	-0.83***	-0.08**	-2.09***	-0.97***
	(0.02)	(0.28)	(0.12)	(0.04)	(0.18)	(0.15)	(0.03)	(0.30)	(0.16)
Successful*(Year of exp)	0.04	0.66**	-0.05	-0.10***	0.38	0.60**	-0.11**	0.22	-0.14
	(0.13)	(0.31)	(0.14)	(0.04)	(0.24)	(0.25)	(0.05)	(0.19)	(0.10)
Successful*After(t=1 to 4)	-0.12**	1.40***	0.36***	0.04	1.00***	0.49**	-0.11***	0.86***	0.34***
	(0.06)	(0.19)	(0.09)	(0.07)	(0.25)	(0.25)	(0.04)	(0.18)	(0.10)
Successful*After(rest)	-0.06**	2.86***	1.01***	0.03	4.09***	0.99***	0.04	2.64***	0.99***
	(0.03)	(0.33)	(0.13)	(0.05)	(0.31)	(0.26)	(0.04)	(0.33)	(0.17)
Firm and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	16,834	16,497	14,963	8,410	8,221	7,449	8,424	8,276	7,514
Number of Clusters/Groups	1,492	1,491	1,469	741	741	724	751	750	745

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; All regression include firm fixed effects and year fixed effects. Robust standard errors, clustered at the firm level, in parenthesis.

Finally, I leave out the survival results as our IV identification strategy fails when including firm-level control variables. While our identification strategy finds some consequences of export failure, it does not find evidence that export failure leads to more firms going out of business. The reason for this may be that firms that are near the production threshold do not attempt to export, and few or no firms will fall in the "exit firms" category identified in the theoretical model.

V Conclusion

Policymakers in developing countries and many economists emphasize the importance of increasing exports as a means to improve economic development. Yet, in these countries, few firms export and most exporters will cease exporting after just one year. Could there be a link between these two facts that explains the lack of export growth in some developing countries? If so, what is the link? Answering this question is critical to ensure that precious government resources are spent is the most efficient way possible. Other papers have examine the link between export failure and low export growth. In this paper, I identify another source, in addition to the probability of export failure, that explains why many firms in developing countries may hesitate to enter the export market: export failure may result in poor domestic market performance. I prove theoretically and empirically that exporting and domestic market performance are linked through financial constraints. These export failure costs, in addition to traditional trade costs (transportation, tariffs, fixed trade costs, etc.), may explain the lack of export growth in some developing countries.

Understanding why some firms fail to enter the export market can help policymakers develop strategies to increase exports. This knowledge is particularly helpful for developing countries where export failure is more prevalent. I develop a heterogeneous-firm model with liquidity constraints and marketing costs to show how export failure can: 1) make the liquidity constraint more likely to bind as a result of additional borrowing, but little or no additional revenue; 2) force financially constrained firms to decrease domestic sales as unsuccessful exporters may be unable to borrow at previous levels as a result of the additional debt from an export attempt; and 3) result in some firms unable to borrow enough to continue operating in the domestic market. I provide empirical support for the model using a Colombian database; I built the database using firm-level trade and financial data. I show that after exporting, unsuccessful exporters that are financially constrained 1) become even more financially constrained, 2) have lower domestic revenue and domestic revenue growth, and 3) are also more likely to go out of business. My main concern with these findings, as explained in detail earlier, is that these findings may be associated with firm trends or firm specific shocks that result in export failure and poor domestic market performance. To deal with concerns about firm trends, I have several control groups and focus on the triple differences. For the most part, the results are robust to these comparisons and nicely match the implications in the model. To deal with concerns about firm-specific shocks, I use an instrumental variable approach where the trend changes in import demand in a foreign market (excluding Colombian imports), *after* a firm enters the market, explain export success but not domestic market performance. These estimates, especially when analysing domestic revenue and domestic revenue growth, are robust to

this instrumental variable approach. No paper, to my knowledge, focuses on unsuccessful exporters after they exit the foreign market nor attempts to quantify the costs to domestic market performance associated with export failure.

The main implication of this paper is that export failure costs, not just the probability of export failure, lower expected returns and limit the number of firms that export. To increase exports policymakers should look beyond increasing market access to increase exports and also focus on lowering both export failure and the costs of export failure. For example, helping firms make informed decisions in entering foreign markets would lower export failure rates and lower the expected costs of an export attempt, resulting in an increase in export growth. Developed countries already have policies in place that help firms make better decision and that result in less export failure. In the U.S., for example, the International Trade Administration (USITA) helps American firms find foreign partners by providing market advice, organizing meetings with potential partners, and even arranging meeting spaces and translators. In addition to leading to better matches abroad, these actions also lower the fixed cost of finding a suitable partner. Finally, the cost of financing itself results in more firms deciding not to expand abroad. Developing countries also have policies in place that help lower trade financing costs. In the US, for example, the Export-Import Bank in the U.S. provides favorable financing options to exporters. This paper provides strong support for similar policies in developing countries and these policies may have just as much of an impact on export growth as increases in market access.

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Appendix A

A.1 Appendix Tables

Table A.1: Business Classifications and availability

Tipo	Descripcion Sociedad	Classification	In Data
1	Personas Naturales	Natural Persons	
2	Establecimientos de Comercio	Establishments of Commerce	
3	Soc. Limitada	Private Limited Company	x
4	Soc. S. A.	Public Limited Company	x
5	Soc. Colectivas	Joint Ventures	x
6	Soc. Comandita Simple	Simple Limited Partnership	x
7	Soc. Comandita por Acciones	Limited joint-stock partnership	x
8	Soc. Extranjeras	Foreign Companies	x
9	Soc. de Hecho	Business Association	
10	Soc. Civiles	Civil Society Organisations.	
11	Reseña Ppal, Suc, Agencia	Head office	
12	Sucursal	Branch	
13	Agencia	Agency	
14	Emp. Asociativas de Trabajo E.A.T	Associative Work Organizations	
15	Entidades Sin Animo de Lucro E.S.A.L.	Non-Profit Entities	
16	Empresas Unipersonales E.U.	Self-Employed Businesses	x

Source: Superintendencia de Sociedades

Table A.2: PPML Estimates: Check Balance on Variables

Explanatory Variable = Successful Exporter	All Periods Before Exporting	One Period Before Exporting
Short-Term Debt	0.17	0.17
	(0.39)	(0.29)
Long-Term Debt	0.17	-0.35
	(0.29)	(0.23)
Short-Term Labor	0.20	0.02
	(0.16)	(0.14)
Long-Term Labor	-0.25	0.11
	(0.68)	(0.41)
Sort-Term Investment	0.13	0.07
	(0.34)	(0.31)
Long-Term Investment	0.77**	0.72**
	(0.36)	(0.33)
Inventory	0.33	0.11
	(0.23)	(0.19)
Property	-0.10	-0.27
	(0.43)	(0.35)
Intangibles	0.54	0.10
	(0.48)	(0.46)
Total Observations	6,018	1,239

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; standard errors, clustered at the firm level, shown in parenthesis. Outcome variables are listed on the left, so the table displays the estimates on the "successful (future) exporter" variable. All regressions are performed by PPML2 (Poisson pseudo-maximum likelihood).

Table A.3: Probability of Exit: Linear Probability Model

	After Exporting: Dependent = Enter		Before Exporting: Dependent = Exit	
Successful	0.00	0.01	-0.04***	-0.08***
	(0.01)	(0.02)	(0.01)	(0.01)
After($\|t = 1 - 5\|$)		-0.00		-0.01
		(0.02)		(0.01)
After (rest)		-0.00		-0.04***
		(0.02)		(0.01)
Successful*After($\|t = 1 - 5\|$)		-0.01		0.04***
		(0.02)		(0.01)
Successful*After(rest)		-0.02		0.08***
		(0.03)		(0.02)
Year FE	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No
Number of observations	5,187	5,187	10,194	10,194
Adjusted R^2	0.141	0.141	0.016	0.019

note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, cluster at the firm level, shown in parenthesis; $t = 0$ is either the first year of exporting or the year right before exporting.

A.2 Proofs and Extensions for Theoretical Section

A.2.a Credit-constrained firm threshold

Maximization problem for unconstrained firms

For financially unconstrained firms, Equation (4) does not bind and firms can borrow as much as they desire. Substituting Equations (2), (3), and (5) into the maximization problem gives the problem for unconstrained unsuccessful exporters:

$$\max_{p_i, L_i} \; E\pi_i(\phi_i) = L_i A p_i^{1-\sigma} - \frac{L_i A \; p_i^{-\sigma}}{\phi_i} - f_x - f_d - L_i^{\beta} \tag{8}$$

Firms set prices by maximizing Equation (8) with respect to p_i. The profit-maximizing price is the following:

$$p_i^* = \frac{\sigma}{\sigma - 1} \frac{1}{\phi_i} = \frac{\mu}{\phi_i} \tag{9}$$

Where $\mu = \frac{\sigma}{\sigma - 1}$ is the firm's constant markup above marginal cost. Notice that L_i levels do not affect this decision.

The number of consumers a firm reaches, L_i, increases net revenue, $p_i q_i - \frac{q_i}{\phi_i}$, but also increases marginal marketing costs, $\beta L_i^{\beta-1}$, at an increasing rate. Profit-maximizing firms set the marginal cost of marketing equal to the marginal revenue of marketing. That is, by maximizing Equation (8) with respect to L_i and substituting in the profit-maximizing price (Equation 9), we get the profit-maximizing marketing expenditure:

$$L_i^* = \left(\frac{A}{\sigma\beta}\right)^{\frac{1}{\beta-1}} \left(\frac{\mu}{\phi_i}\right)^{\frac{1-\sigma}{\beta-1}} \tag{10}$$

Since neither the fixed-exporting costs nor foreign revenue affects this decision, all financially unconstrained firms in the domestic market, regardless of their classification (non-exporter, unsuccessful exporter, and successful exporter), choose L_i^*. L_i^* is increasing in productivity, $\frac{\partial L_i^*}{\partial \phi_i} > 0$.

Constrained firm threshold

For all financially constrained firms, Equation (4) binds when setting price and marketing levels equal to the profit-maximizing p_i and L_i. For the firm at the constrained/unconstrained threshold, Equation (4) binds and yet the firm still chooses p_i^* and L_i^*. To find this firm, we substitute all of the constraints from the maximization problem and the profit-maximizing p_i^* and L_i^* into Equation (4),

and solve for ϕ_i. For unsuccessful exporters, the constrained threshold firm, ϕ_C^{fail}, is the following:

$$\phi_C^{fail} = \mu \left(\frac{A}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}} \left(\frac{f_x + f_d - (1-\lambda)f_e}{\lambda\beta - 1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{11}$$

Had this firm not tried to export, it would not have the export loan, and would be in better financial health. This can be seen by comparing this firm to a similar non-exporting firm. The constrained threshold firm for the non-exporters is the same, except we set $f_x = 0$. Thus, we can also think of the threshold firm ϕ_C^{dom} as the threshold firm for all exporters before trying to enter the foreign market:

$$\phi_C^{dom} = \mu \left(\frac{A}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}} \left(\frac{f_d - (1-\lambda)f_e}{\lambda\beta - 1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{12}$$

Successful exporters have to pay the fixed export costs, just like the unsuccessful exporters, but now have two revenue sources. While all successful exporters sell abroad, not all will export at the profit maximizing p_i^* and L_i^*. The constrained threshold firm for successful exporters depends on the size of the foreign market, foreign prices, and the other trade costs. If the successful exporter enters a foreign market similar to that of the home market, $Y_h = Y_f = Y$, with a price level equal to that of the domestic level times the iceberg trade costs, $P_f = P_h \cdot \tau_{if} = P$, then $A_f = A_h \cdot \tau_{if}^{\sigma-1}$ and the threshold firm for successful exporters, ϕ_C^{succ}, becomes:

$$\phi_C^{succ} = \mu \left(\frac{A}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}} \left(\frac{f_x + f_d - (1-\lambda)f_e}{2(\lambda\beta - 1)}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{13}$$

For the general case where the firm does not export to a market similar to that of the home market, see Appendix A.2.g.[18]

A.2.b Proof of Proposition 1

Proof for the first statement: We can think of the cutoff for non-exporters as the cutoff before a firm attempts to exports, irrespective of export success. Thus, to prove the first part of the proposition, I compare the constrained threshold for successful and unsuccessful exporters, individually, with that of the non-exporter threshold.

To prove that the threshold for unsuccessful exporters is higher after the export attempt ($\phi_C^{dom} < \phi_C^{fail}$), Equation (11) must be bigger than Equation (12). This holds as long as $f_x > 0$. Notice also that the threshold increases with exporting fixed costs ($\frac{\partial \phi_C}{\partial f_x} > 0$). The sign of the derivative is positive because $\frac{1-\beta}{\beta(1-\sigma)} > 0$; since $\beta > 1$ is required for an interior marketing solution and $\sigma > 1$ is

[18] An alternative way of thinking about this is to focus on foreign profits, inclusive of loan repayment costs. Whether or not the threshold decreases or increases depends on whether foreign profits, inclusive of loan repayment, are positive. Risk-neutral firms enter the export market as long as foreign profits, excluding the loan markup, are positive. Thus, it is possible that net foreign profits, inclusive of loan repayment costs, are negative.

required for an interior pricing solution; and we assume fixed costs are greater than the collateral times the financial friction ($f_d > (1-\lambda)f_e$) and $\lambda\beta > 1$.

To prove that the threshold for successful exporters is higher after exporting ($\phi_C^{dom} < \phi_C^{succ}$), Equation (13) must be larger than Equation (12). This holds as long as $f_d - f_x < (1-\lambda)f_e$. This must hold since $(1-\lambda)f_e > 0$ and we assume that $f_x > f_d$. Thus, some successful exporters that were not previously financially constrained might become constrained.

Proof for the second statement: For the second statement, I compare the thresholds between successful exporters (Equation 13) and unsuccessful exporters (Equation 11). Comparing the two thresholds, we see that $\phi_C^{succ} < \phi_C^{fail}$ if

$$\frac{1}{2}\left(f_x + f_d - (1-\lambda)f_e\right) < \left(f_x + f_d - (1-\lambda)f_e\right)$$

This holds because we assume that $(1-\lambda)f_e < f_x + f_d$. While both types of firms are worse off in terms of domestic revenue, the difference between successful and unsuccessful financially constrained exporters is that the successful ones are not solely dependent on the domestic market for their revenue.

A.2.c Credit-constrained firm marketing decision

For financially constrained firms, choosing the profit-maximizing p_i and L_i results in Equation (4) binding. These firms are unable to get their desired financing and reduce their need for financing by lowering their marketing costs, which results in fewer consumers. The marginal revenue from reaching more consumers is constant while the marginal costs will be increasing. Furthermore, reaching more consumers, higher L_i, requires more financing, $\frac{\partial F(L_I)}{\partial L_i} = \beta L_i^{\beta-1}$, which increases the repayment necessary to meet creditors' demands, $\frac{\partial B_i}{\partial L_i} = \frac{\beta L_i^{\beta-1}}{\lambda}$. These two equations only equal when there are no financial frictions ($\lambda = 1$). An unconstrained risk-neutral firm discounts the repayment by λ. A financially constrained firm is unable to discount because of the liquidity constraint, and sets L_i below L_i^*. Since deviation from optimum L_i lowers profits, the firm deviates as little as possible to ensure that the creditors break even. The second-best L_i for unsuccessful exporters is determined by setting Equation (4) to equality and substituting in Equations (2), (3), (5) and (9). We get the following equation:

$$\frac{L_i A}{\sigma}\left(\frac{\mu}{\phi_i}\right)^{1-\sigma} - \frac{L_i^\beta}{\lambda} = \frac{f_x + f_d - (1-\lambda)f_e}{\lambda} \tag{14}$$

For the before-exporting decision, set $f_x = 0$. This is also the L_i chosen by non-exporters. Thus, non-exporters choose L_i based on the following equation:

$$\frac{L_i A}{\sigma}\left(\frac{\mu}{\phi_i}\right)^{1-\sigma} - \frac{L_i^{\beta}}{\lambda} = \frac{f_d - (1-\lambda)f_e}{\lambda} \tag{15}$$

For financially constrained successful exporters, the firm's choice of L_i depends on the foreign market and the trade costs. So, a previously financially constrained firm can become more constrained, less constrained or, even, unconstrained. It depends on the net revenue from the foreign market. As before, if a firm enters a similar sized market ($Y_h = Y_f = Y$) with a foreign price level equal to that of the domestic price times the iceberg trade costs ($P_f = P_h \cdot \tau_{if} = P$), then $A_h = A_f = A$ and the successful exporter chooses the following L_i in both markets:

$$\frac{L_i A}{\sigma}\left(\frac{\mu}{\phi_i}\right)^{1-\sigma} - \frac{L_i^{\beta}}{\lambda} = \frac{f_x + f_d - (1-\lambda)f_e}{2\lambda} \tag{16}$$

Below I show that there is a lower-bound for L_i, prove that L_i is increasing with productivity ($\frac{\partial L_i}{\partial \phi_i} > 0$), and link L_i to domestic revenue.

Lower threshold for L_i

While we can't solve for L_i, we know L_i is between the profit-maximizing L_i (Equation 10) and the L_i that maximizes the left-hand side of Equations (14) to (16). Notice that maximizing the left-hand side of Equations (14) to (16) with respect to L_i is just like maximizing expected profits with respect to L_i in the unconstrained case, except that the marketing costs are divided by λ.[19] There is no incentive to lower L_i beyond the value that maximizes the left-hand side of the above equation because beyond that point the *discounted* marginal repayment cost of marketing, $\beta L_i^{\beta-1}$, is lower than the marginal revenue of marketing, $p_i q_i - \frac{q_i}{\phi_i}$; and the firm would be better off increasing L_i.

The L_i maximizing the left-hand side of equations (14) to (16) is given by the following equations:

$$L_i^C = \lambda^{\frac{1}{\beta-1}}\left(\frac{A}{\sigma\beta}\right)^{\frac{1}{\beta-1}}\left(\frac{\mu}{\phi_i}\right)^{\frac{1-\sigma}{\beta-1}} \tag{17}$$

From Equations (10) and (17), we can see that $L_i^C = \lambda^{\frac{1}{\beta-1}} L_i^*$. Since $\lambda < 1$ and $\beta > 1$, then $\lambda^{\frac{1}{\beta-1}} < 1$ and $L_i^C < L_i^*$. Thus, as in Manova (2013), financially constrained firms choose either an L_i that

[19] $\frac{L_i^{\beta}}{\lambda}$ is the repayment for the marketing costs, while L_i^{β} is the marketing expenditure. L_i^{β} is also the expected repayment for the marketing expenditure. Since $0 < \lambda < 1$, more weight is given to the marketing costs here than in the maximization problem for financially unconstrained firms.

lies between these two values or one of these two values.

Proof that Constrained L_i is Increasing in ϕ_i

The equations for the constrained L_i choice for all firms are identical on the left hand side: $\frac{L_i A}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma} - \frac{L_i^{\beta}}{\lambda}$ (see Equation 14 for the unsuccessful exporter choice, Equation 15 for the domestic producer choice, and Equation 16 for the successful exporter choice). The right hand side differs, but it does not vary by productivity or marketing choice. To prove that the constrained L_i choice is increasing in ϕ_i I take the total derivative of each of the equations and set them equal to zero. In all cases we get the following:

$$\frac{dL_i}{d\phi} = \frac{(\sigma-1)\phi^{\sigma-2}\frac{L_i A}{\sigma}(\mu)^{1-\sigma}}{\frac{\beta L_i^{\beta-1}}{\lambda} - \frac{A}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma}} > 0$$

This is positive since $\sigma > 1$, and $\frac{\beta L_i^{\beta-1}}{\lambda} > \frac{A}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma}$, that is, for financially unconstrained firms, marginal revenue from marketing is less than the marginal cost from marketing. Notice that $\frac{A}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma}$ is the marginal revenue of marketing and $\frac{\beta L_i^{\beta-1}}{\lambda}$ is the marginal cost of borrowing for marketing costs. All firms are risk neutral, and all unconstrained firms choose the L_i that sets the *discounted* marginal cost, $\beta L_i^{\beta-1}$, equal to the marginal revenue of marketing, $\frac{A}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma}$. The *discounted* marginal cost is below the marginal cost of borrowing for marketing, $\frac{\beta L_i^{\beta-1}}{\lambda}$. Financially constrained firms would like to do the same, but doing so makes their liquidity constraint bind. As they decrease L_i, their marginal cost of borrowing for marketing decreases, but it is still above their marginal revenue. Deviating from the profit maximizing L_i also means lower expected profits, so the firms deviate as little as possible.

As mentioned above, there is no point in lowering L_i below L_i^C, and hence no point in lowering marginal costs below that which equates marginal revenue to marginal cost of borrowing for marketing. So the least productive firm to produce has to set marginal cost of borrowing for marketing equal to marginal revenue of marketing. All firms set marginal cost of borrowing for marketing greater than or equal to the marginal revenue $\left(\frac{\beta L_i^{\beta-1}}{\lambda} \geq \frac{A}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma}\right)$ and only unconstrained firms set the *discounted* marginal cost of marketing equal to marginal revenue of marketing $\left(\beta L_i^{\beta-1} = \frac{A}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma}\right)$.

Domestic revenues before and after exporting

Domestic revenue (v_i) for all firms is $p_i q_i = L_i A \left(\frac{\mu}{\phi_i}\right)^{1-\sigma}$. This is because L_i does not affect the pricing decision and all firms, whether financially constrained or not, set p_i equal to p_i^*. L_i, as shown above, does depends on a firm's productivity draw and on whether or not the firm is financially constrained. To get the domestic revenue for financially unconstrained firms, substitute in the profit-maximizing L_i (L_i^* from Equation 10) into the domestic revenue equation to get the profit-maximizing domestic revenue:

$$v_i^* = A^{\frac{\beta}{\beta-1}} \left(\frac{1}{\sigma\beta}\right)^{\frac{1}{\beta-1}} \left(\frac{\mu}{\phi_i}\right)^{\frac{\beta(1-\sigma)}{\beta-1}} \tag{18}$$

For financially constrained firms, L_i is determined by Equations (14), (15), and (16), depending on whether the firm is an unsuccessful exporter, a non-exporter, or a successful exporter, respectively. This L_i for financially constrained firms in all cases, as mentioned above, is between the profit maximizing L_i^* (Equation 10) and L_i^C (Equation 17). Thus, total domestic revenues is between the total domestic revenues for financially unconstrained firms (Equation 18) and the lower-bound domestic revenue for all firms. To get the lower-bound domestic revenues , substitute in the lower-bound L_i (L_i^C from Equation 17) into the domestic revenue equation to get the lower-bound domestic revenue:

$$v_i^C = \lambda^{\frac{1}{\beta-1}} A^{\frac{\beta}{\beta-1}} \left(\frac{1}{\sigma\beta}\right)^{\frac{1}{\beta-1}} \left(\frac{\mu}{\phi_i}\right)^{\frac{\beta(1-\sigma)}{\beta-1}} \tag{19}$$

The lower bound in Equation (19) does not depend on the classification of the firm (non-exporter, unsuccessful exporter, or successful exporter). It does, however, depend on the productivity draw. Notice that $v_i^C = \lambda^{\frac{1}{\beta-1}} v_i$, so $v_i^C < v_i$.

A.2.d Proof of Proposition 2

Proof for the first statement: We can think of the L_i for non-exporters as the L_i for successful and unsuccessful exporters before these firms attempted to export. Thus, to prove the first part of the proposition, I simply compare the L_i choice for successful and unsuccessful exporters, individually, with that of non-exporters. As mentioned earlier, L_i is decreasing between the profit-maximizing L_i^* and L_i^C, so $\frac{\partial LHS_i}{\partial L_i} < 0$ in Equation (14) – (16). Since $\frac{\partial LHS_i}{\partial L_i} < 0$, to prove that the L_i for constrained unsuccessful exporters is lower after exporting ($L^{dom} > L^{fail}$), I have to show that the right-hand side of Equation (14) is higher than that of Equation (15), that is $f_d - (1-\lambda)f_e < f_x + f_d - (1-\lambda)f_e$. Since $0 < f_x$, then $L^{dom} > L^{fail}$. Alternatively, we can also note that $\frac{\partial L_i}{\partial f_x} < 0$. We can show that $\frac{\partial RHS_i}{\partial f_x} > 0$, and thus $\frac{\partial L_i}{\partial f_x} < 0$. Taking the derivative of the right hand side with respect to f_x, we get $\frac{\partial RHS_i}{\partial f_x} = \frac{1}{\lambda} > 0$, and $\frac{\partial L_i}{\partial f_x} < 0$.

For constrained successful exporter, whether the firm reaches more ore less domestic consumers

($L^{dom} > L^{succ}$) depends on whether or not the new market loosens or tightens the financial constraint. If the export market is similar to the home market, then it is likely that entering the new market tightens the constraint and the firm reaches fewer domestic consumers. We can see this by comparing Equations (15) and (16). $L^{dom} > L^{succ}$ when

$$f_d - (1-\lambda)f_e < \frac{1}{2}\left(f_x + f_d - (1-\lambda)f_e\right)$$

That is, when $f_d - f_x < (1-\lambda)f_e$. Which must be the case as we assume $f_d < f_x$ and $0 < (1-\lambda)f_e$.

Proof for the second statement: We can prove that the constrained L_i is less for unsuccessful than for successful exporters ($L^{fail} < L^{succ}$) from Equation (14) and Equation (16). In those equations we see that successful exporters are better off as long as $\frac{1}{2}\left(f_x + f_d - (1-\lambda)f_e\right) < \left(f_x + f_d - (1-\lambda)f_e\right)$. Which is the case, as we already showed in Appendix A.2.b.

A.2.e Firm production threshold

Some potentially profitable firms will stop producing as a result of export failure. Firms with productivity below ϕ_i^0 do not produce because, even if they give all profits to the creditor, the creditor still does not break even. The cutoff is defined by the constrained firm, ϕ_i^0, whose L_i choice equals L_i^C. That is, the firm producing at the lower-bound L_i. As mentioned above, there is no incentive to set L_i below this level.

To identify the firm producing at the threshold, substitute Equation (17) into Equation (14). Solving for ϕ_0 gives the firm producing at the production threshold for unsuccessful exporters:

$$\phi_0^{fail} = \mu\left(\frac{A\lambda}{\sigma}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_x + f_d - (1-\lambda)f_e}{\beta - 1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{20}$$

The threshold for non-exporters is also the threshold for all firms before they enter the export market. Set $f_x = 0$ to get the non-exporting firm producing at the production threshold:

$$\phi_0^{dom} = \mu\left(\frac{A\lambda}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_d - (1-\lambda)f_e}{\beta - 1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{21}$$

Firms know the potential consequences of entering the export market. No firm exports if export success would force it to default.

A.2.f Proof of Proposition 3

Proof for the first statement: We can think of the production cutoff for non-exporters as the production cutoff for successful and unsuccessful exporters before the firms attempt to exports. To prove the first statement, I compare successful and unsuccessful exporters, individually, with non-exporters.

To prove that the production threshold for unsuccessful exporters is higher after exporting ($\phi_0^{dom} < \phi_0^{fail}$), I have to show that $f_d - (1-\lambda)f_e < (f_x + f_d - (1-\lambda)f_e)$. This holds as long as $f_x > 0$. Alternatively, I can prove that $\frac{\partial \phi_0}{\partial f_x} > 0$ or that the following is greater than zero:

$$\frac{\partial \phi_0^{fail}}{\partial f_x} = \mu \left(\frac{A}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}} \frac{1-\beta}{\beta(1-\sigma)} \lambda^{\frac{\beta}{1-\beta}} \frac{1}{\beta-1} \left(\lambda^{\frac{\beta}{1-\beta}} \frac{1}{\beta-1} (f_x + f_d - (1-\lambda)f_e)\right)^{\frac{1-\beta}{\beta(1-\sigma)}-1} > 0$$

This sign is positive because 1) $\frac{1-\beta}{\beta(1-\sigma)} > 0$ since $\beta, \sigma > 1$, 2) $f_x + f_d > (1-\lambda)f_e$ since we assume $f_x > f_d > f_e$, and 3) $\frac{1}{\beta-1} > 0$ since $\beta > 1$.

Proof for the second statement: Since firms export only if they expect to be better off, no firms exports if they would be worse off conditional of surviving abroad. Since the production threshold for unsuccessful exporters is higher after exporting than before, it means the production threshold is also higher for unsuccessful than successful exporters ($\phi_0^{succ} < \phi_0^{fail}$).

A.2.g General Case: Successful Exporters

Unconstrained threshold for successful exporters: For the firms that export to foreign market f (successful exporters), we get the following financial constraint:

$$p_{ih}q_{ih} - \frac{q_{ih}}{\phi_i} + p_{if}q_{if} - \frac{\tau_{if}q_{if}}{\phi_i} \geq B_i$$

For a financially constrained firm, this equation binds when setting the price and marketing levels equal to the profit-maximizing p^*_{ih}, p^*_{if}, L^*_{ih} and L^*_{if}. To get the threshold for constrained/unconstrained firms, we bind the equation above and substitute in the firm's profit-maximizing prices and marketing level. Substituting in the demand equation, the marketing function, profit-maximizing prices and the modified creditors' constraint (which needs to include the new loans for marketing in all countries) into the liquidity constraint for successful exporters we get the following threshold:

$$\frac{L^*_{ih}A_h}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma} - \frac{L^{*\beta}_{ih}}{\lambda} + \frac{L^*_{if}A_f}{\sigma}\left(\frac{\mu\tau_{if}}{\phi}\right)^{1-\sigma} - \frac{L^{*\beta}_{if}}{\lambda} = \frac{f_x + f_d - (1-\lambda)f_e}{\lambda}$$

Substituting in L^*_{ih} from Equation (10) and the profit-maximizing L^*_{if}, we get the following condition:

$$\left(\frac{A_h}{\beta\sigma}\right)^{\frac{\beta}{\beta-1}}\left(\frac{\mu}{\phi}\right)^{\frac{\beta(1-\sigma)}{\beta-1}}+\left(\frac{A_f}{\beta\sigma}\right)^{\frac{\beta}{\beta-1}}\left(\frac{\mu\tau_{if}}{\phi}\right)^{\frac{\beta(1-\sigma)}{\beta-1}}=\frac{f_x+f_d-(1-\lambda)f_e}{\beta\lambda-1}$$

Simplifying:

$$\phi_C^{succ}=\mu\left(\frac{1}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_x+f_d-(1-\lambda)f_e}{\lambda\beta-1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}}\left(A_h^{\frac{\beta}{\beta-1}}+A_f^{\frac{\beta}{\beta-1}}\left(\tau_{if}\right)^{\frac{\beta(1-\sigma)}{\beta-1}}\right)^{-\frac{1-\beta}{\beta(1-\sigma)}}$$

Note that I assume that either the firm uses domestic labor for foreign marketing or that the foreign market wages are the same as those of the domestic market. I also assume that there are no additional trade costs in marketing.

If the firm enters a similar size market ($Y_h = Y_f = Y$) with a price level equal to that of the domestic level times the iceberg trade costs ($P_f = P_h \cdot \tau_{if}$), then $A_f = A_h \cdot \tau_{if}^{\sigma-1}$ and the above equation simplifies to:

$$\phi_C^{succ}=\mu\left(\frac{A}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_x+f_d-(1-\lambda)f_e}{2(\lambda\beta-1)}\right)^{\frac{1-\beta}{\beta(1-\sigma)}}$$

Credit-constrained marketing decision for successful exporters: A successful exporter must decide how much to charge for its product and how much to spend on marketing at home and abroad. The product prices are not affected by the liquidity constraint, and the firm always charges the profit maximizing prices in each market. Substituting these prices into the expected profit equation and the modified credit budget constraint into the maximization problem, we get the following:

$$Max\ E\pi_i(p_i,L_i;\phi_i)=\frac{L_{ih}A_h}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma}-L_{ih}^{\beta}+\frac{L_{if}A_f}{\sigma}\left(\frac{\mu\tau_{if}}{\phi}\right)^{1-\sigma}-L_{if}^{\beta}-f_x-f_d$$

Subject to the binding financing constraint:

$$\frac{L_{ih}A_h}{\sigma}\left(\frac{\mu}{\phi}\right)^{1-\sigma}-\frac{L_{ih}^{\beta}}{\lambda}+\frac{L_{if}A_f}{\sigma}\left(\frac{\mu\tau_{if}}{\phi}\right)^{1-\sigma}-\frac{L_{if}^{\beta}}{\lambda}\geq\left(\frac{f_x+f_d-(1-\lambda)f_e}{\lambda}\right)$$

Using ε as the multiplier, we get:

$$\frac{\partial \pi_i}{\partial L_{ih}} : \quad \frac{\sigma \beta L_{ih}^{\beta-1}}{A_h \left(\frac{\mu}{\phi_i}\right)^{1-\sigma}} = \frac{1+\varepsilon}{1+\frac{\varepsilon}{\lambda}}$$

$$\frac{\partial \pi_i}{\partial L_{if}} : \quad \frac{\sigma \beta L_{if}^{\beta-1}}{A_f \left(\frac{\mu \tau_{if}}{\phi_i}\right)^{1-\sigma}} = \frac{1+\varepsilon}{1+\frac{\varepsilon}{\lambda}}$$

$$\frac{\partial \pi_i}{\partial \varepsilon} : \quad \frac{L_{ih} A_h}{\sigma} \left(\frac{\mu}{\phi}\right)^{1-\sigma} - \frac{L_{ih}^{\beta}}{\lambda} + \frac{L_{if} A_f}{\sigma} \left(\frac{\mu \tau_{if}}{\phi}\right)^{1-\sigma} - \frac{L_{if}^{\beta}}{\lambda} = \frac{f_x + f_d - (1-\lambda) f_e}{\lambda}$$

This means that $L_{if} = \left(\frac{A_f}{A_h}\right)^{\frac{1}{\beta-1}} (\tau_{if})^{\frac{1-\sigma}{\beta-1}} L_{ih}$. Substituting L_{if} out of the financial constraint:

$$\left(\frac{L_{ih} A_h}{\sigma} \left(\frac{\mu}{\phi}\right)^{1-\sigma} - \frac{L_{ih}^{\beta}}{\lambda}\right) \left(1 + \left(\frac{A_f}{A_h}\right)^{\frac{\beta}{\beta-1}} (\tau_{if})^{\frac{\beta(1-\sigma)}{\beta-1}}\right) = \frac{f_x + f_d - (1-\lambda) f_e}{\lambda}$$

Thus, the firm chooses the L_{ih} that solves the following equation:

$$\frac{L_{ih} A_h}{\sigma} \left(\frac{\mu}{\phi}\right)^{1-\sigma} - \frac{L_{ih}^{\beta}}{\lambda} = \left(1 + \left(\frac{A_f}{A_h}\right)^{\frac{\beta}{\beta-1}} (\tau_{if})^{\frac{\beta(1-\sigma)}{\beta-1}}\right)^{-1} \frac{f_x + f_d - (1-\lambda) f_e}{\lambda}$$

If the firm enters a similar sized market ($Y_h = Y_f = Y$) with a price level equal to that of the domestic level times the iceberg trade costs ($P_f = P_h \cdot \tau_{if}$), then the above equation simplifies to:

$$\frac{L_{ih} A_h}{\sigma} \left(\frac{\mu}{\phi}\right)^{1-\sigma} - \frac{L_{ih}^{\beta}}{\lambda} = \frac{f_x + f_d - (1-\lambda) f_e}{2\lambda}$$

Firm production threshold for successful exporters: The firm production threshold for successful exporters does not change. All firms want to supply both markets and no firm would enter the export market if it knew that, conditional on surviving in the export market, it would have to exit the domestic market.