Title
Export Failure and its Consequences: Theory and Evidence

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Publication Date
2015

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA
SANTA CRUZ

EXPORT FAILURE AND ITS CONSEQUENCES: THEORY AND EVIDENCE

A dissertation submitted in partial satisfaction
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

ECONOMICS

by

Jesse Mora

June 2015

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Abstract

EXPORT FAILURE AND ITS CONSEQUENCES: THEORY AND EVIDENCE

Jesse Mora

The purpose of this dissertation, "Export Failure and Its Consequences: Theory and Evidence," is to argue that exporting is a risky endeavor and that there are consequences to export failure. 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, trade literature often views exporting as a harmless exercise based on a simple cost-benefit analysis of foreign profits. This rationale ignores the differential effect export failure may have on financially constrained firms.

The first chapter develops a heterogeneous-firm model with financial constraints and marketing costs to show how export failure can: 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. Using Colombian firm-level data and two identification techniques (difference-in-difference and an instrumental variable approach), I provide empirical support for these propositions and find evidence that export failure has a differential impact on financially constrained firms. After exporting, financially constrained unsuccessful exporters have a higher probability of going out of business, lower domestic revenue, and lower domestic revenue growth; the findings are robust to comparisons with similar successful exporters and even non-exporters.

The second chapter expands on my initial findings. I begin by noting similarities between firms that export and firms that expand beyond their original export market: 1) Few firms export and few firms expand beyond their original market, and 2) most new exports only do so for one year and many firms that expand only do so for one year. I argue that attempting to expand beyond the original export destination or product bundle and failing can have an effect similar to that of export failure. That is, expansion failure can have negative feedback effects on the original export market. I find that unsuccessful expansions are associated with lower export revenue in the original export market, slower export revenue growth, and a greater probability of exiting the export market. The poor export performance is stark when compared with that of firms that successfully expand and even those that do not expand. The evidence with the second group, however, is mixed when measuring market performance in terms of the probability of exiting the export market. Either way, the effect of expansion failure are worse when measuring the original market by the initial product bundle than by the initial destinations reached; this may imply that the effect of expansion failure is greater when expanding to new products than when expanding to new destinations.

Acknowledgments

I would not have finished my dissertation without the support of family, friends, and committee members. I am particularly grateful to my advisor, Dr. Alan Spearot. His patience, guidance, support, and encouragement were fundamental in helping me find my way. Alan, thank you for believing in me and for the countless hours spent reading my drafts!

I am grateful to my committee members (Dr. Nirvikar Singh and Dr. Jon Robinson) and Dr. Johanna Francis (my unofficial committee member) for their support and tireless work done on my behalf. I also thank those who provided very helpful comments and discussions: Robert Feenstra, Katheryn Russ, Federico Díez, Costas Arkolakis, Tibor Besedeš, Peter Morrow, Sven Arndt, JaeBin Ahn, Kenneth Kletzer, Justin Marion, Carlos Dobkin, Jennifer Poole, Grace Gu, George Bulman, Ajay Shenoy, Dario Pozzoli, Manuel Barron, Pia Basurto, and Evan Smith.

This PhD would not have been possible without the support of my beautiful wife, Rithika, and my loving son, Davi. Rithika, thank you for your support and for keeping me focused throughout this process. Who knew you could do a PhD and still have some very fun times! I cannot thank you enough for your friendship, support, and sacrifices. I'm ready for our next adventure! Davi, it was wonderful to hear you scream "papa" and to hear your little feet running to greet me as I got home. That alone put a smile on my face and turned any bad day around.

Lastly, I'd like to thank my parents, Jesus and Beatriz Mora, who have always encouraged me to follow my dreams where ever they led me. Me dieron el amor, la confianza, y fuerza para poder tener éxito en mi vida. Gracias por todo!

Chapter 1

Export Failure and Its Consequences: Evidence from Colombian Exporters

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,

[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).

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 harmless exercise based on a simple 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. The 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 chapter, 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 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. No paper to my knowledge focuses on failed exporters, provides stylized facts about these firms, nor links export failure with poor domestic market performance. My work fills this gap.

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 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 (the export fixed costs); the search fee gives the firm a chance to randomly match with a foreign distributor. Since a foreign

[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.

distributor is necessary to sell any quantity in a foreign country, export failure results 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.

In the empirics I test the propositions of the model while also considering alternative explanations for the stylized facts. I 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 lower domestic revenue, lower domestic revenue growth, and a higher probability of going out of business. In the medium run—and in some cases the short run—the association is strong even when comparing unsuccessful exporters with matched non-exporters and successful exporters.[3] Since the differences are statistically insignificant in the long run, a firm that manages to keep its doors open can over come the negative shock. Note, however, that since export failure may lead to firms exiting the domestic market, the long-run estimates may suffer from attrition.[4] Finally, to address additional endogeneity concerns, I follow Hummels,

[3]I define the short run as the year firms first export, $t = 0$; medium run as the following five years, $t = 1 - 5$; and long run as the remaining "after" periods, $t > 5$. I explain why I make a distinction between these three periods in Section IV.

[4]The levels and Poisson estimates include zero values for firms that exit the domestic market and show that attrition works against finding any negative long-run effects.

Jørgensen, Munch, and Xiang (2014) and 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. In the IV results, the medium-run differences continue to be strong and statistically significant for the three outcome variables.

The work in this chapter 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.[5] This chapter 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 export failure. Integrating the costs found in this chapter into estimates of fixed costs may explain why the estimated fixed export costs are so high.

This chapter also contributes to the literature on export survival.[6] 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 understand-

[5] 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).

[6] 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.

ing 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 chapter 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 chapter 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) differ-

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

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

II Stylized Facts for New Exporters and Data Description

In this section, I describe the data, provide summary statistics, and offer empirical motivation for my findings. I use an event study analysis to compare

the domestic market performance—before and after entering a foreign market—of firms exporting at the same time, but differing in export success. The analysis identifies stylized facts about the two types of new exporters (successful and unsuccessful) and presents a more complete picture of the association between domestic market performance and exporting. Table 1.1 summarizes these stylized facts. The findings are, in most cases, robust to comparisons with similar successful exporters and unsuccessful exporters that are not financially constrained.

Table 1.1: Summary of Three Stylized Facts

Fact 1:	After exporting, financially constrained unsuccessful exporters are more likely to exit the domestic market than their successful counterparts.
Fact 2:	After exporting, financially constrained unsuccessful exporters decrease domestic revenue. Their successful counterparts do much better.
Fact 3:	After exporting, financially constrained unsuccessful exporters have lower domestic revenue growth. Their successful counterparts do better, but the difference is not statistically significant.

II.1 Data sources and sample

I use Colombian firm level data to analyze the link between export failure and domestic market performance. Using Colombian data for this analysis is ideal for several reasons. First, I am able to merge two data sets: one with domestic financial data and the other with trade data. The trade data help determine whether or not firms are successful at exporting, the products firms export, and the destination of these products. The financial data provide information on domestic revenue, and also on various other financial variables (eg. assets, liabilities, etc.).

Second, since firms in developing countries have a higher probability of export failure than those in developed ones (see Besedeš and Prusa 2011), the consequence associated with such failure may be more acute in developing countries; thus it makes sense to use data from a developing country, such as Colombia, in the analysis. Finally, these data provide a fairly long panel (16 years), and I can observe firm behavior several years before and after first exporting.

I use Colombian customs data as reported by the Colombian National Directorate of Taxes and Customs (DIAN) to get firm-level exports for the 1994–2011 period. Each transaction includes a firm 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.[7] Although the data are at the transaction level, I aggregate to the annual level. I do this for two reasons. First, exporting is intrinsically discrete; aggregating eliminates seasonal fluctuation and accounts for the fact that some firms import infrequently to take advantage of economies of scale and to account for delivery lags (Alessandria, Kaboski, and Midrigan, 2010). Second, I aggregate the trade data to match the level of aggregation for the financial data.

I use Colombian financial data as reported by the Superintendency of Corporations ("Superintendencia de Sociedades") to get balance sheet information for firms producing in the 1995–2011 period. These data only include firms under the jurisdiction of the agency, which is part of the Colombian Ministry of Commerce, Industry and Tourism; they are publicly available in the "Sistema de Informacion y Reporte Empresarial" (SIREM) database. The financial data are

[7] I ignore firms whose tax identifiers do not conform to the standard nine-digit number. The trade data are the same used in Eaton et al. (2007) and add up to within one percent of UN COMTRADE exports.

self-reported and must be provided annually by law. These data do not include the universe of firms and do not come from a survey, but do include 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). They 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.[8] The financial data include the firm name, sector, tax identifier, year, and various balance sheet information (liabilities, assets, revenue, etc.) in Colombian pesos. There is a possibility that a firm did not report 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 chose to break the law. In either case, if a firm does not report its financial data, I interpret this as representing a bad outcome and simply treat the firm as exiting the domestic market.

To get the data sample used in this paper I merge the two data sets using the year and tax identifier and make some additional restrictions. If a firm does not export for more than one year, I consider such a firm as a failed exporter. However, I allow successful exporters to exit and enter the export market. I exclude a firm that has missing financial data in any period between its first and last year of production; I do this because there are very few such firms and keeping them would result in missing data for reasons other than the firm exiting the domestic market. I make the additional requirement that all firms have financial data for at least three consecutive years: two years before exporting and the year of exporting. Thus, in the sample, all firms at a minimum have one domestic revenue

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

growth observation before exporting and one observation after. Finally, since new exporters are the focus of this paper, I exclude continuous exporters from the estimates. I define continuous exporters as firms that have trade data in 1994, the first year available with trade data. Non-exporters are excluded in some estimates; I define these firms as firms with no export data in the period analyzed. The 2010 export cohort is excluded since, for these firms, there is not enough information in the after period to calculate the medium-rum effect for the firm exit variable; keeping this group in the sample does not alter the results. I end up with 15,381 firm-year observations, 838 successful exporters, and 574 unsuccessful exporters.[9]

Variable definitions

There are three main outcome variables: 1) Domestic Revenue, 2) Domestic Revenue Growth, and 3) Exit from the domestic market. Since the financial data only include total revenue by firm, I subtract total exports from total revenue to calculate domestic revenue.[10] Domestic Revenue equals either the level domestic revenue in Colombian Pesos or the natural log of domestic revenue for firm i at time t. Domestic Revenue Growth for firm i at time t equals the difference in log domestic revenue between time t and time $t-1$. Exits from the domestic market equals one if the firm exits the domestic market, and zero otherwise. Note that this last variable does not vary by time since firms in the sample enter and exit only once; so estimates for the probability of exiting from the domestic market do not come from panel regressions and do not include firm fixed effects.

[9] I include as many non-exporters as unsuccessful exporters in the Propensity Score Matching estimates.

[10] This might introduce measurement error in the Domestic Revenue variable if firm financial data do not match the timing of the trade data.

The main covariates of interest are the following: successful exporter (S_{it}), unsuccessful exporter (U_{it}), and a measurement of financial constraint (NFV). U_{it} equals one for new exporters that fail to export beyond a 12-month period, and zero otherwise. Thus, a firm that exports in two calendar years but fewer than 12 months can still be classified as unsuccessful. S_{it} equals one for all other new exporters, and zero otherwise. Since I am interested in comparing financially constrained firms, I separate financially- and financially-unconstrained firms. A firm is financially vulnerable ($NFV = 0$) if the ratio of cash flow from operations to total assets is less than the median for all new exporters at the time of first exporting ($t = 0$), and a firm is not financially vulnerable ($NFV = 1$) if the same ratio for a firm is above or equal to the median. 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 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.

II.2 Summary statistics

The trade data show why focusing on unsuccessful exporters is important.[11] However, the importance of these firms may be overlooked in the overall sample. For instance, on average about nine thousand Colombian firms export in any given

[11] See Eaton et al. (2007) for a through discussion on the export dynamics of Colombian firms. Note, however, that I do not use the same definitions used in that paper, and so the numbers in this paper will not match those of Eaton et al. (2007). For example, I define unsuccessful exporters, what they call "single year" exporters, as firms that are unable to export for more than 12 months and they define them as firms that exported in year t but not in $t-1$ or $t+1$.

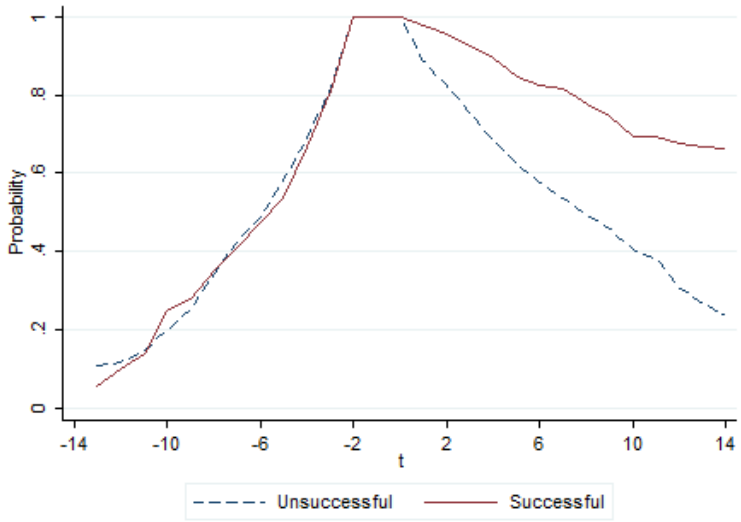
year. Of these, 2,458 are continuous exporters, 4,242 are successful exporters, and 1,817 are unsuccessful exporters (see Appendix Table 1.A.2). On average, continuous exporters account for most of the export value (almost three fourths of all exports), successful exporters account for a bit over one fourth, and unsuccessful exporters account for the rest (less than one percent). Yet unsuccessful exporters make up the vast majority of new exporting firms; on average, unsuccessful exporters account for almost two thirds of new exporters, and successful exporters account for the rest. While unsuccessful exporters tend to export less than their share of firms, they still represent about a third of the export value from new exporters.

The financial data put the importance of exporters in context. On average, the financial data cover over fifteen thousand firms per year; 12 percent are continuous exporters, 70 percent are non-exporters, 12 percent are successful exporters, and 5 percent are unsuccessful exporters. While I find that 30 percent of firms export at least once, the number is inflated by the fact that the data do not come from a random sample, and the firms in the sample tend to be fairly large. In fact, 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. These data confirm findings in other papers: few firms export, only the most productive firms export, those that do export start small.

II.3 Empirical motivation

I find that domestic market performance is correlated with exporting, and the association depends on both the export success and financial vulnerability of a firm; that is, the effect depends on whether or not the firm was successful at exporting and on whether or not a firm was financially vulnerable when it first exported. Looking at three outcome variables, I identify three stylized facts regarding export failure and domestic market performance.

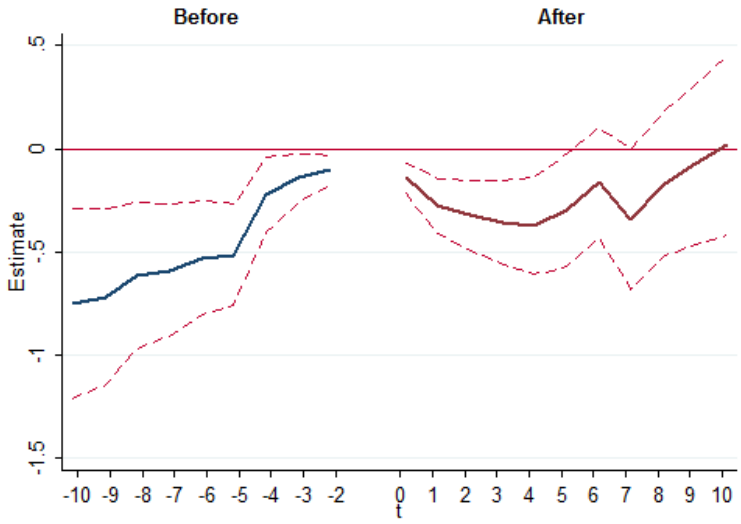
Figure 1.1: Firm Entry and Exit



Note: The probability of being in the data set 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 $t = -2, -1, 0$.

The first stylized fact is that going out of business is more likely for unsuccessful than successful exporters. Figure 1.1 shows the share of firms in the sample by export success and exporting period; it is an average of all export cohorts. In the figure, by design, all firms are in the sample two periods before exporting

Figure 1.2: Ln(Domestic Revenue): Unsuccessful Exporters
(Financially Constrained Firms)



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

$(t = -1, -2)$ and the year the firm first exports $(t = 0)$. 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. However the two types of firms are very different in the after-exporting period $(t \geq 0)$; those periods show the time from start of exporting to end of domestic production. There we see that unsuccessful exporters are more likely to exit the domestic market than successful ones. For example, 80 percent of successful exporters are still producing five years after first exporting, but only 60 percent of unsuccessful exporters are still producing in the same period. The difference in survival rates is increasing over time. This difference, however, disappears if I compare the probability of exiting the domestic market conditional on producing at time t (the hazard rate). I get similar results if I

separate financially vulnerable firm from the two types of exporters; the difference is that financially vulnerable firms are more likely to exit the domestic market than their their non-financially vulnerable counterparts.

The second stylized fact is that after export failure domestic revenue decreases for unsuccessful exporters and the drop is more pronounced for financially vulnerable ones. In event-study Figure 1.2, we can see how such financially vulnerable unsuccessful exporters performed in all periods before and after exporting relative to $t = -1$ (the year right before exporting).[12] The figure comes from a regression with firm and year fixed effects that includes the whole data sample.[13] In the before-exporting period, domestic revenue grows as firms gets closer to exporting, but the trend changes dramatically afterward. In the before-exporting periods these firms were in an upward trajectory; so, for these firms, exporting was not a last resort effort to stay in business. Domestic revenue decreases for these unsuccessful exporter after exporting and eventually stalls at pre-exporting levels. The drop is quite significant in the short term; relative to $t = -1$, domestic revenue decreases about 10 percent the year the firm exports ($t = 0$) and this decreases to

[12]For similar figures using matched data see Appendix Figures 1.A.1, 1.A.2, and 1.A.3.

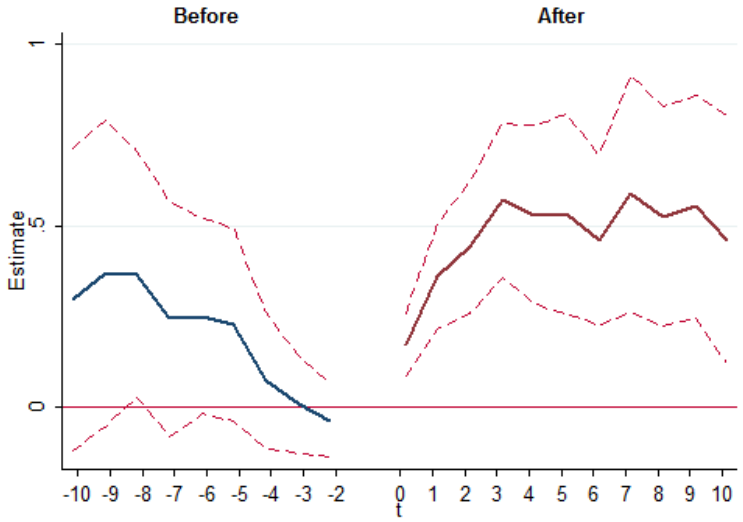
[13]The regression equation for the event study is the following:

$$
\begin{aligned}
Y_{i,t} = & \sum_{s=-14}^{-2} \beta_{1s} Before_{is} + \sum_{s=0}^{14} \beta_{1s} After_{is} + \\
& \sum_{s=-14}^{-2} \beta_{2s} Before_{is} \cdot Succ_i + \sum_{s=0}^{14} \beta_{2s} After_{is} \cdot Succ_i + \\
& \sum_{s=-14}^{-2} \beta_{1s} Before_{is} \cdot NFV_i + \sum_{s=0}^{14} \beta_{1s} After_{is} \cdot NFV_i + \\
& \sum_{s=-14}^{-2} \beta_{2s} Before_{is} \cdot Succ_i \cdot NFV_i + \sum_{s=0}^{14} \beta_{2s} After_{is} \cdot Succ_i \cdot NFV_i + \\
& \alpha_i + \delta_t + u_{i,t}
\end{aligned}
$$

The regression includes firm fixed effects (α_i) and calendar year fixed effects (δ_t).

about 25 percent the next five years. For the median firm in $t = -1$, whose total revenue is about 4 billion pesos (roughly US$ 2 million), this would account for a drop of 400 million pesos the year the firm first exports and 1 billion pesos each of the following five years.

Figure 1.3: Ln(Domestic Revenue): Unsuccessful vs. Successful Exporters (Financially Constrained Firms)



Note: Regression includes firm fixed effects and year fixed effects.

There may be numerous explanations why financially vulnerable unsuccessful exporters see a drop in domestic revenue after exporting. One possible explanation is that the figure may be capturing firm trends that have little to do with export failure. If that is the case, a difference-in-difference framework is more appropriate than a pre- and post-exporting analysis. Such a framework may be necessary if, for example, firms tend to export at peak production, and a decrease in domestic revenue after the peak may be expected. In event study Figure 1.3 I estimate the difference between financially vulnerable successful exporters and unsuccessful ones; the figure comes from the same regression as Figure 1.2. There

are two benefits to using an event study analysis for this comparison. First, we can see if the "control" group (successful exporters) has a similar trend to the "treatment" group (unsuccessful exporters) in before-exporting periods. We see in the figure that there are almost no statistically significant differences in pre-exporting periods; so both financially vulnerable successful and unsuccessful exporters have similar trends in domestic revenue before exporting.[14] The second benefit of the event study analysis is that we can see how both firm types react after exporting. After exporting, financially vulnerable, successful exporters are much better off compared with their unsuccessful counterparts; these differences are statistically significant. The difference is such that domestic revenue for financially vulnerable successful exporters does not decrease at $t = 0$ or any other post-exporting periods, relative to $t = -1$.

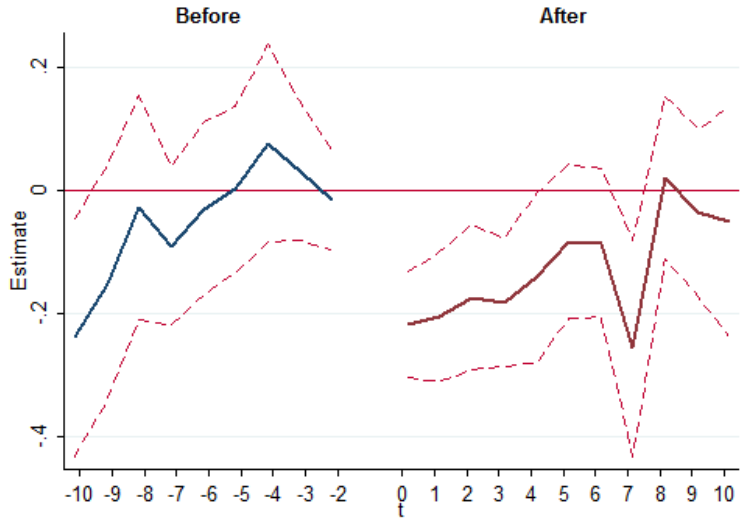
To test if firm-specific trends are driving my results, I replicate the figures above but using domestic revenue growth as the outcome variable. These results identify a third stylized fact: domestic revenue growth decreases after exporting for both financially vulnerable unsuccessful and successful exporters in the short and medium run. In event study Figure 1.4, we again see how financially vulnerable unsuccessful exporters behaved before and after exporting.[15] While domestic revenue growth picks up before a firm exports, this growth is, for the most part, not statistically different than that of the $t = -1$ period. In the after-exporting period, however, there is a large and statistically significant drop in the growth rate. Domestic growth decreases by about 20 percent the year the firm first exports, and while growth improves after that, it is still lower than the $t = -1$

[14] While the point estimates are large in this figure, they are much smaller in the matched data (see Appendix Figure 1.A.5).

[15] For similar figures using matched data see Appendix Figures 1.A.4, 1.A.5, and 1.A.6.

growth for several years. Growth eventually returns to its trend about five years after exporting.

Figure 1.4: ΔLn(Dom. Revenue) for Unsuccessful Exporters (Financially Constrained Firms)



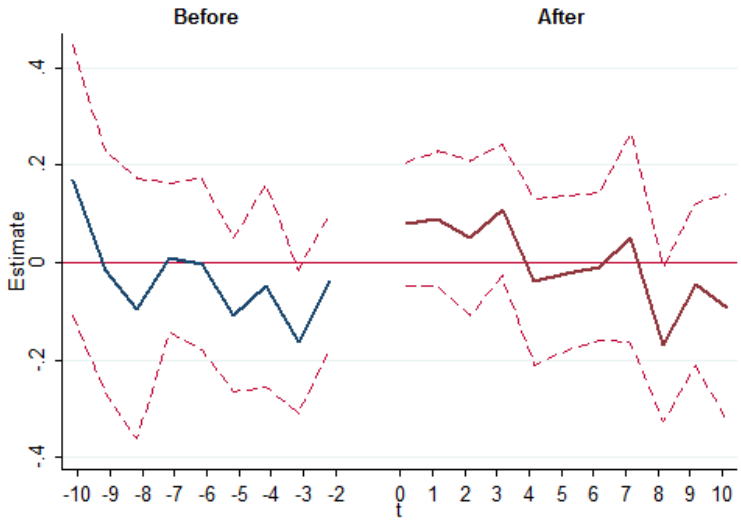
Note: Regression includes firm fixed effects and year fixed effects. The omitted group is constrained, unsuccessful exporters at time $t = -1$.

I compare the difference in domestic revenue growth between financially vulnerable successful and unsuccessful exporters to see how their trends differ. While these successful exporters are doing relatively worse in the before-exporting period, these differences are not statistically significant. When comparing these firms in the after-exporting period, we see a relative increase for successful exporters, but the difference is again not statistically significant (see Figure 1.5). Part of the reason I may not find a statistically significant difference may be that liquidity constraints may hinder revenue growth in the domestic market for successful exporters.[16] That is, successful exporter may require more financing to supply

[16] Alternatively, we would see a similar outcome if capacity constraints were an issue. That is,

two markets. If firms are financially constrained and require external financing to generate domestic revenue, firms may lower such spending in the domestic market in order to supply another market. Nevertheless, a drop in domestic revenue growth for successful exporters is less worrisome as these firms make up for a loss in domestic revenue with foreign revenue. A drop in domestic revenue growth is more worrisome for unsuccessful exporters as a loss in domestic revenue is not associated with foreign revenue. Even though liquidity constraints make it difficult to find a difference between successful and unsuccessful exporters, when I do a more traditional difference-in-difference study—with a pre- and a post-period comparison—in the empirics section, I find statistically significant difference between these two groups of firms.

Figure 1.5: ΔLn(Dom. Revenue): Unsuccessful vs. Successful Exporters (Financially Constrained Firms)



Note: Regression includes firm fixed effects and year fixed effects.

because successful exporters are supplying the two markets, capacity constraints may prevent these firms from supplying the domestic market to the same extent that they were in the pre-exporting period.

II.4 Discussion

While the association above is clear, it may be that successful and unsuccessful exporters are systematically different and successful exporters are not a good counterfactual for unsuccessful exporters. For example, firms may have invested differently or had different debt levels; observable variables that may be different include short-term debt, long-term debt, short-term labor expenditure, long-term labor expenditure, short-term investment, long-term investment, inventory, property, intangibles (patents, etc.). As seen in Appendix Table 1.A.3, however, most of the differences are not statistically significant. The only exception is long-term investment, successful exporters have over 70 percent more long-term investment than do unsuccessful ones. This applies to both the whole before-exporting period and also just the year before exporting. Successful exporters may have invested and upgraded to become competitive abroad. These pre-export, observable differences—even if there are few—make it clear that I must be careful when making the comparison between successful and unsuccessful exporters. The comparison is complicated by the fact that there might be unobserved, time-varying differences between the two groups. It may also be that it takes time to reorient the firm to serve only the domestic market; that firms experience different negative, long-lasting productivity shocks that correlate with exporting; or that the two groups export for different reasons. In the sections below, I attempt to rule out as many of these alternative explanations as possible and establish export failure as at least partially responsible for the negative performance seen after export failure.

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

In the previous section, I identified three stylized facts about unsuccessful exporters (see Table 1.1 for a summary). In this section, I develop a simple two-country, Melitz-type model with domestic outcomes as a function of export success. This model replicates the stylized facts and motivates the empirics. I follow Manova (2013) in modeling financial frictions and Arkolakis (2010) in modeling marketing costs. In the model, firms fail abroad if they do not find a suitable partner abroad. Unlike most trade models with firm heterogeneity, which focus on the firm export-entry decision, I focus on the firm's decision after export success has been determined. I contrast the ex post profit-maximizing decisions between non-exporters, unsuccessful exporters, and successful exporters. I identify three testable predictions from the model: exporting for unsuccessful exporters, compared with successful exporters and non-exporters, results in a tighter financial constraint, lower domestic revenue, and higher probability of default.

III.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 goods 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.[17] Goods are substitutes, which implies that $0 < \rho < 1$ and that the elasticity of substitution between two goods is given by $\sigma = \frac{1}{1-\rho} > 1$. Aggregate prices are given by $P = \left(\int_{i\epsilon\Omega} p_i^{(1-\sigma)} di\right)^{\frac{1}{1-\sigma}}$ and aggregate consumption/aggregate utility per individual is given by $U = C = \left(\int_{i\epsilon\Omega} c_i^{\rho} di\right)^{\frac{1}{\rho}}$. Total revenue and expenditure per individual is given by $P \cdot C = Y$. Individuals maximize utility subject to a revenue constraint: $\int_{i\epsilon\Omega} p_i c_i di = Y$. Optimal consumption in each country, per individual who buys variety i, is given by $c_i = \frac{p_i^{-\sigma}}{P^{1-\sigma}} Y$. Finally, total consumption of variety i in each country is given by $q_i = L_i c_i = L_i \frac{p_i^{-\sigma}}{P^{1-\sigma}} Y$, where L_i is the number of individuals in a given country who buy variety i from firm i. L_i is endogenously determined by a firm's marketing expenditure.

III.2 Firms

Setup of the model

Firms enter under uncertainty. Firm pay a fixed entry fee, f_e, to enter the home market. This fee is in terms of labor and is a tangible asset that can be used as collateral. After paying f_e, the firm then draws a unit labor requirement coefficient, ϕ_i, from a known distribution $G(\phi_i)$. Upon receiving its productivity draw, the firm decides whether or not to produce; low productivity firms never remain in the market. All producing firms must pay an additional overhead labor cost, f_d, in order to produce in the home market (similar to Melitz, 2003); this cost is also in terms of labor. All firms must also market its products to consumers. Marketing costs, $F(L_i)$, determine the number of individuals a firm reaches. I assume marketing has increasing marginal costs and that firms only use domestic

[17] For convenience, I leave out country subscripts where the distinction is clear.

labor in marketing for any market. Wages are normalized to one.

After entry into the domestic market, firms must decide whether or not to enter the export market. If the firm decides to enter the export market, it must pay an export entry fee, f_x, which is in terms of labor. Firms enter the export market under uncertainty and pay f_x to find if they match with a foreign distributor/-partner. A foreign distributor is necessary to sell any quantity abroad. The share of firms that are successfully matched with a foreign distributor is γ and the share unable to find a suitable match abroad is $(1-\gamma)$. I assume firms are risk-neutral and that γ is determined outside of the model.[18] By making the export matching probability exogenous, I abstract from the export-entry decision and instead focus on the decision after export success has been determined. For convenience, I assume that unsuccessful exporters do not gain revenue from exporting.[19]. For the conclusions to hold, unsuccessful exporters must lose profits from exporting; that is, the revenue from exporting does not cover the export entry fee, marketing expenditure, and variable cost spent to supply the foreign market. As mentioned in the introduction, this is likely to be the case for most new exporters.

Firms borrow twice before profits are realized. The first is to pay exporting fixed costs, f_x. The second is to pay for marketing, $F(L_i)$, and overhead labor costs in the domestic market, f_d. As in Manova (2013), I assume that firms cannot use profits from a previous period or other savings to pay for these costs.

[18]Studies have found that firms upgrade before exporting, increasing export survival (see Bustos, 2011). But upgrading tends to takes place on the upper end of the distribution and not by financially constrained firms.

[19]I do this as unsuccessful exporters tend to receive a negligible amount of foreign revenue the year that they export (see Section II.2)

I also assume that all firms must borrow the full amount of these costs.[20] If a firm cannot borrow to pay the marketing expenses and overhead labor costs, it cannot produce. Since it cannot produce, it also can't pay back the first loan; it subsequently loses its collateral and goes out of business.[21] These firms must replace their collateral if they wish to produce in the future. Financial frictions exist because creditors cannot collect all debts; creditors collect debt from λ share of firms and can't collect debt from $(1-\lambda)$ share of firms. Thus, just as in Manova (2013), the probability of default is exogenous to the model.[22] I do this to abstract from the lending decision and instead focus on the firm decision.

After borrowing, firms produce and earn profits. Firms use these profits to pay off their debt. See Table 1.2 for a summary of the sequence.

Table 1.2: Summary of Sequence of Events

1.	Pay entry fee (f_e), get productivity draw (ϕ_i), and decide whether or not to enter the domestic market.
2.	Borrow, if exporting is desirable, to pay for the export entry fee (f_x). f_x is a matching fee.
3.	Realization of matching draw determines export success.
4.	Borrow for marketing costs ($F(L_i)$) and overhead labor costs (f_d).
5.	Produce, sell, and pay off loans.

[20] I do this for convenience. For the conclusions of the model to hold, firms need to pay a percentage of the fixed costs and upfront marketing costs with outside capital. Thus, the conclusions here are more applicable to firms that are more dependent on outside capital.

[21] Risk-neutral creditors lend the export entry fee to some firms that, conditional on the firm discovering that it is an unsuccessful exporter, will be unable to borrow the second installment. Creditors charge higher repayment fees when repayment is not certain to ensure they do not lose money.

[22] Endogenous default would reinforce the findings of this model. The reason is that firms with a higher probability of default are either not able to borrow or have higher repayment costs. If costs are higher, then the firms that find that exporting is not viable are likely to become even more constrained and have a higher probability of becoming insolvent than in the exogenous default case. Thus, borrowing becomes even more difficult.

Firm maximization problem before export success has been determined

After the initial productivity draw, the only uncertainty is in the loan repayment and in a firm's match/export success. Firms pay the export entry fee if they are, conditional on surviving abroad, better off. All firms with expected foreign profits greater than or equal to zero enter the export market. If the probability of export survival were certain and if there were no financial frictions, the model would solve to something similar to that in Arkolakis (2010). The key difference between this model and the existing literature is that firms pay f_x to find an export match, and the match success is uncertain.[23] Since matching success is determined outside of the model, and all firms attempt to enter the export market if expected foreign profits are greater than or equal to zero, similar firms can enter the export market and differ in export success.

Firm maximization problem after export success has been determined

After export success is determined, there are three types of firms in the market: non-exporters, unsuccessful exporters, and successful exporters. Non-exporters supply only the home market and borrow to pay for the overhead costs, f_d, and marketing expenditure, $F(L_i)$. Unsuccessful exporters also supply only the home market, but have additional debt burden because of the export loan. Successful exporters also have the export loan, but supply both the home and foreign markets.[24] In this section, I focus on the unsuccessful exporter decisions and also

[23]This idea is similar to that of Albornoz et al. (2012), but the focus of the model is on the ex post profit maximization problem, not the ex ante maximization problem.

[24]Expected profits equal the sum of net revenue from the home and, if relevant, foreign markets minus expected loan repayment. The expected loan repayment is the loan, B_i, times the probability of paying back the loan, λ, plus the collateral, f_e, times the probability of losing the collateral, $1 - \lambda$.

provide the solutions for the non-exporter and successful exporter decisions.

For unsuccessful exporter i, the ex post maximization problem is as follows:

$$E\pi(\phi_i) = \max_{p_i, q_i, L_i} \left\{ p_i q_i - \frac{q_i}{\phi_i} - \lambda B_i - (1-\lambda) f_e \right\} \tag{1.1}$$

Subject to

$$q_i = L_i \frac{p_i^{-\sigma}}{P^{1-\sigma}} Y \tag{1.2}$$

$$F(L_i) = L_i^{\beta} \tag{1.3}$$

$$p_i q_i - \frac{q_i}{\phi_i} \geq B_i \tag{1.4}$$

$$\lambda B_i + (1-\lambda) f_e \geq f_x + f_d + F(L_i) \tag{1.5}$$

Equation (1.1) is the profit function. Equation (1.2) is total demand for the variety produce by firm i. This is the demand function for individual varieties (see the consumer decision problem for details). Equation (1.3) is the marketing expenditure for the variety produced by firm i. $F(L_i)$ is 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 (1.4) is the firm's liquidity constraint. Net revenues—revenue minus variable cost, excluding the loan repayment—must be larger than or equal to the loan repayment, B_i. That is, net revenues must be greater than B_i. This constraint binds for low productivity firms. Equation (1.5) is the risk-neutral, creditors' constraint. Creditors fund a firm if expected net returns from the loan are greater than their outside option; this option is normalized to zero. This constraint ensures creditors do not lose money and thus are always be willing to

lend when expected repayment is non-negative. Assuming perfect competition in the credit markets, this constraint holds with equality. If B_i is not repaid, creditors take the collateral, f_e. The left-hand side is the expected return from the loan and the right-hand side is the size of the loan. All firms need to borrow to pay the same export entry fee, f_x, and have the same collateral, f_e, but less productive firms earn lower revenues and thus have lower repayment capabilities.

In the following analysis, I make two key assumptions:

Assumption 1: $max\left\{\frac{f_e - f_d}{f_e}, \frac{1}{\beta}\right\} < \lambda$

Assumption 2: $f_x > f_d$

Assumption (1) ensures that $f_d > (1-\lambda)f_e$ and $\beta\lambda > 1$. The expected cost of defaulting, $(1-\lambda)f_e$, cannot be larger than the expected cost of repaying the overhead costs. Otherwise, the expected cost of borrowing would be higher than the actual cost. It would also mean borrowing costs are prohibitively high for most firms; few firms, if any, would want or be able to borrow. Assumption (2) implies that that the fixed costs are higher in the foreign market than in the domestic market; this ensures that only the most productive firms export. The necessity of the two assumptions will become obvious in the following subsections.

III.3 Credit-constrained firm threshold

Maximization problem for unconstrained firms

For financially unconstrained firms, Equation (1.4) does not bind and firms can borrow as much as they desire. Substituting Equations (1.2), (1.3), and (1.5)

into the maximization problem gives the problem for unconstrained unsuccessful exporters:

$$\max_{p_i, L_i} \; E\pi_i(\phi_i) = L_i \frac{p_i^{1-\sigma}}{P^{1-\sigma}} Y - \frac{L_i \frac{p_i^{-\sigma}}{P^{1-\sigma}} Y}{\phi_i} - f_x - f_d - L_i^{\beta} \tag{1.6}$$

Firms set prices by maximizing Equation (1.6) with respect to p_i. The profit-maximizing price is the following:

$$p_i^* = \frac{\sigma}{\sigma - 1} \frac{1}{\phi_i} = \frac{\mu}{\phi_i} \tag{1.7}$$

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. By maximizing Equation (1.6) with respect to L_i and substituting in the profit-maximizing price (Equation 1.7), we get the profit-maximizing marketing expenditure:

$$L_i^* = \left(\frac{Y}{\sigma \beta} \right)^{\frac{1}{\beta - 1}} \left(\frac{\mu}{P \phi_i} \right)^{\frac{1-\sigma}{\beta - 1}} \tag{1.8}$$

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, $\beta L_i^{\beta - 1}$. Firms set the marginal cost of marketing equal to the marginal revenue of marketing. Since neither the fixed-exporting costs nor foreign revenues affect this decision, all financially unconstrained firms in the domestic market, regardless of their classification (non-exporter, unsuccessful exporter, and successful exporter), choose L_i^*. Firms set different L_i^* because of differences in productivity, ϕ_i. L_i^* is increasing in productivity, $\frac{\partial L_i^*}{\partial \phi_i} > 0$.

Unconstrained firm threshold

For a financially constrained firm, Equation (1.4) 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 (1.4) binds and yet the firm still chooses p_i^* and L_i^*. To find this firm, substitute all of the constraints from the maximization problem and the profit-maximizing p_i^* and L_i^* into Equation (1.4), and solve for ϕ_i. For unsuccessful exporters, the threshold firm, ϕ_C^{fail}, is the following:

$$\phi_C^{fail} = \frac{\mu}{P}\left(\frac{Y}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_x + f_d - (1-\lambda)f_e}{\lambda\beta - 1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{1.9}$$

Had this firm not tried to export, it would not have the export loan, and would be in better financial health. To find the unconstrained threshold firm for non-exporters, set $f_x = 0$. Thus, the threshold firm ϕ_C^{dom} is the threshold firm for all exporters before trying to enter the foreign market and also for all non-exporting firms:

$$\phi_C^{dom} = \frac{\mu}{P}\left(\frac{Y}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_d - (1-\lambda)f_e}{\lambda\beta - 1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{1.10}$$

Successful exporters have to pay the fixed export costs, just like the unsuccessful exporters, but have two revenue sources. While all successful exporters sell abroad, not all will export at p_i^* and L_i^*. The unconstrained 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 times the iceberg trade costs, $P_f = P_h \cdot \tau_{if} = P$, then the threshold firm for successful

exporters, ϕ_C^{succ}, becomes:

$$\phi_C^{succ} = \frac{\mu}{P}\left(\frac{y}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_x + f_d - (1-\lambda)f_e}{2(\lambda\beta - 1)}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{1.11}$$

For the general case where the firm does not export to a market similar to that of the home market, see Appendix A.3.a.[25]

Proposition 1: Some successful and unsuccessful exporters become liquidity constrained as a result of exporting. Controlling for firm productivity, unsuccessful exporters are more likely to become liquidity constrained than successful exporters ($\phi_C^{succ} < \phi_C^{fail}$).

Proof: The constrained unconstrained threshold firm for non-exporters is the before exporting threshold, irrespective of export success. To prove the first part of the proposition, I compare, individually, successful and unsuccessful exporters with non-exporters. To prove the second part I compare the threshold firm for successful and unsuccessful exporters. See proof in Appendix A.3.b.

III.4 Credit-constrained firm marketing decision

For financially constrained firms, choosing the profit-maximizing p_i and L_i results in Equation (1.4) binding. These firms are unable to get their desired financing and reduce their need for financing by lowering the number of consumers reached. Reaching more consumers, higher L_i, requires more financing, $\frac{\partial F(L_I)}{\partial L_i} = \beta L_i^{\beta-1}$,

[25] 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.

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 creditors are guaranteed repayment ($\lambda = 1$). 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 (1.4) to equality and substituting in Equations (1.2), (1.3), (1.5) and (1.7). We get the following equation:

$$\frac{L_i Y}{\sigma}\left(\frac{\mu}{P\phi_i}\right)^{1-\sigma} - \frac{L_i^\beta}{\lambda} = \frac{f_x + f_d - (1-\lambda)f_e}{\lambda} \tag{1.12}$$

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:

$$\frac{L_i Y}{\sigma}\left(\frac{\mu}{P\phi_i}\right)^{1-\sigma} - \frac{L_i^\beta}{\lambda} = \frac{f_d - (1-\lambda)f_e}{\lambda} \tag{1.13}$$

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 the successful exporter chooses the following L_i in both markets:

$$\frac{L_i Y}{\sigma}\left(\frac{\mu}{P\phi_i}\right)^{1-\sigma} - \frac{L_i^\beta}{\lambda} = \frac{f_x + f_d - (1-\lambda)f_e}{2\lambda} \tag{1.14}$$

See Appendix A.3.a for the general case where the firm does not export to a market similar to that of the home market.

In all cases above, L_i is increasing in productivity, $\frac{\partial L_i}{\partial \phi_i} > 0$ (see Appendix A.3.c).

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 1.8) and the L_i that maximizes the left-hand side of Equations (1.12) to (1.14). Notice that maximizing the left-hand side of Equations (1.12) to (1.14) with respect to L_i is just like maximizing expected profits with respect to L_i, except that the marketing costs are divided by λ.[26] 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 marginal repayment cost of marketing, $\beta L_i^{\beta-1}$, is lower than the marginal revenue of marketing, $p_i q_i - \frac{q_i}{\phi_i}$; the firm would be better off increasing L_i.

The L_i maximizing the left-hand side of equations (1.12) to (1.14) is given by the following equations:

$$L_i^C = \lambda^{\frac{1}{\beta-1}} \left(\frac{Y}{\sigma\beta}\right)^{\frac{1}{\beta-1}} \left(\frac{\mu}{P\phi_i}\right)^{\frac{1-\sigma}{\beta-1}} \tag{1.15}$$

From Equations (1.8) and (1.15), 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

[26] $\frac{L_i^\beta}{\lambda}$ 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.

constrained firms choose an L_i that lies between or one one of these two values.

Revenues before and after exporting

Domestic revenue (v_i) for all firms is $p_i q_i = L_i Y \left(\frac{\mu}{P\phi_i}\right)^{1-\sigma}$. 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, however, does depends on a firm's productivity draw and on whether or not the firm is financially constrained. For financially unconstrained firms, substitute in the profit-maximizing L_i (L_i^* from Equation 1.8) into the domestic revenue equation to get the profit-maximizing domestic revenue:

$$v_i^* = Y^{\frac{\beta}{\beta-1}} \left(\frac{1}{\sigma\beta}\right)^{\frac{1}{\beta-1}} \left(\frac{\mu}{P\phi_i}\right)^{\frac{\beta(1-\sigma)}{\beta-1}} \tag{1.16}$$

L_i^*, for unconstrained firms, does not depend on export success. For financially constrained firms, L_i is determined by Equations (1.12), (1.13), and (1.14), 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 1.8) and L_i^C (Equation 1.15). Thus, total domestic revenues is between the total domestic revenues for financially unconstrained firms (Equation 1.16) and the lower-bound domestic revenue for all firms. The lower-bound domestic revenues is given by the following:

$$v_i^C = \lambda^{\frac{1}{\beta-1}} Y^{\frac{\beta}{\beta-1}} \left(\frac{1}{\sigma\beta}\right)^{\frac{1}{\beta-1}} \left(\frac{\mu}{P\phi_i}\right)^{\frac{\beta(1-\sigma)}{\beta-1}} \tag{1.17}$$

The lower bound in Equation (1.15) 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 $v_i^C < v_i$.

Proposition 2: Some financially constrained firms, regardless of their success abroad, have lower domestic revenues as a results of exporting. Controlling for firm productivity, the decrease in domestic revenue is greater for financially constrained unsuccessful exporters than for successful ones; that is, $v_C^{dom} > v_C^{succ}, v_C^{fail}$.

Proof: From $p_i q_i = L_i Y \left(\frac{\mu}{P\phi_i}\right)^{1-\sigma}$, we see that anything that lowers L_i also lowers revenue. Since the threshold for constrained firms (Proposition 1) and the threshold for exiting the domestic market (Proposition 3) both increase for unsuccessful exporters, the L_i chosen by the firms on the two thresholds also increases. In Appendix A.3.d, I show that some liquidity constrained firms, regardless of their success abroad, have lower L_i as a results of exporting. After controlling for firm productivity, the decrease in L_i is greater for financially constrained unsuccessful exporters than for financially constrained successful ones.

III.5 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. 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 get the firm producing at the threshold, substitute Equation (1.15) into Equation (1.12). Solving for ϕ_0 gives the firm producing at the production threshold for unsuccessful exporters:

$$\phi_0^{fail} = \frac{\mu}{P}\left(\frac{Y\lambda}{\sigma}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_x + f_d - (1-\lambda)f_e}{\beta - 1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{1.18}$$

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:

$$\phi_0^{dom} = \frac{\mu}{P}\left(\frac{Y\lambda}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_d-(1-\lambda)f_e}{\beta-1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}} \tag{1.19}$$

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

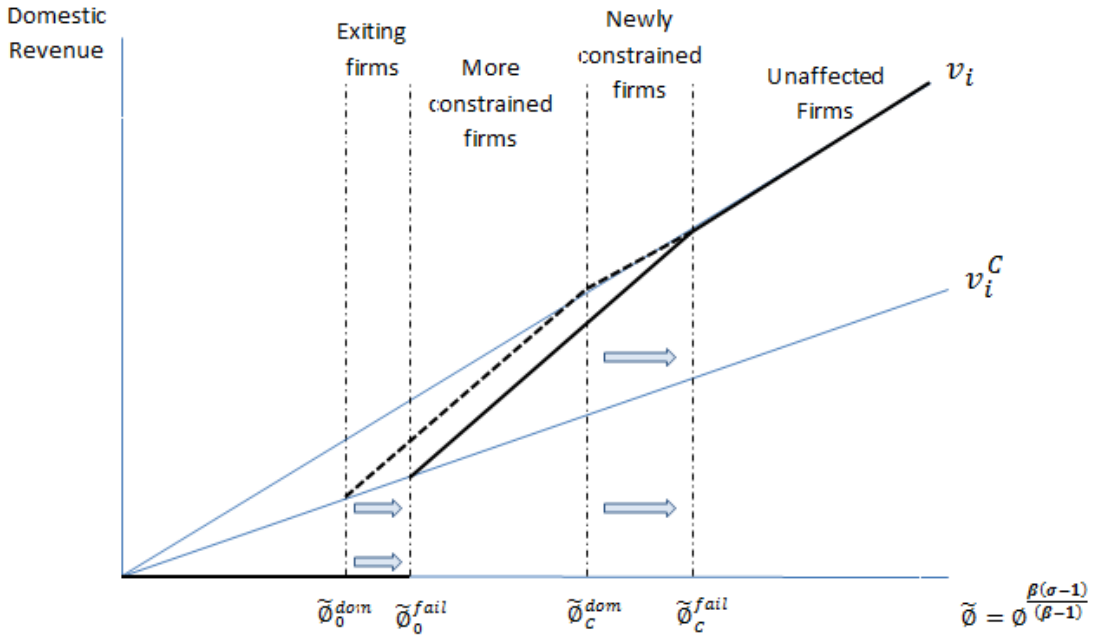
Proposition 3: Some unsuccessful exporters are unable to borrow and stop production because of exporting; that is $\phi_0^{fail} > \phi_0^{dom}$. Unsuccessful exporters are also more likely to fail in the domestic market than successful exporters.

Proof: See proof in Appendix A.3.e.

III.6 Discussion

The model shows that there are two types of new exporters: successful and unsuccessful. 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. In the model exporting has a differential impact on domestic market performance depending on whether or not a firm is successful abroad and whether or not a firm is financially constrained. Lower productivity exporters essentially gamble with their domestic sales when exporting. Higher productivity exporters, given their distance from their financial constraint, can attempt to enter the foreign markets without substantial negative consequences to export failure. The gamble for all

Figure 1.6: Unsuccessful exporters: before and after export failure



exporters is that $(1-\gamma)$ share of them pay the export fixed cost using profits from the home market, and γ share of them pay the export fixed cost with profits from two markets. Furthermore, for lower productivity exporters the gamble results in lower domestic market performance. 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.[27]

Figure 1.6 illustrates the consequences of export failure in terms of domestic revenue.[28] 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 do-

[27]Exporting is appealing even to financially constrained successful exporters because even though some lose domestic revenue, they are overall better off. Indeed, this is the reason why many firms attempt to export—paying high export fixed costs—even when the majority of new exporters are unsuccessful abroad.

[28]A similar graph could be drawn for successful exporters selling to a symmetrical country, but the effect on domestic revenue would be lower. More importantly, however, the firm would be better off since the firm has revenue from two markets.

mestic revenue as a function of firm productivity; that is, Equations (1.16) and (1.17), respectively.[29] The figure shows the constrained cutoff ($\tilde{\phi}_C$) and the production cutoff ($\tilde{\phi}_0$) for unsuccessful exporters, $fail$, and non-exporters, dom. For unsuccessful exporters, we can think of the dom outcomes as the before-exporting productivity and domestic revenue pairs, and the $fail$ outcomes as the after-exporting productivity and domestic revenue pairs. After attempting to export, unsuccessful exporters with productivity above $\tilde{\phi}_C^{fail}$ are not affected, those between $\tilde{\phi}_C^{fail}$ and $\tilde{\phi}_0^{fail}$ decrease domestic revenue, and those between $\tilde{\phi}_0^{dom}$ and $\tilde{\phi}_0^{fail}$ default and exit the domestic market. In the figure, I divide the firms into four categories: 1) unaffected firms, 2) newly constrained firms, 3) more constrained firms, and 4) exiting firms. These categories in turn motivate my empirical findings.

IV Empirical Evidence: Export Failure and Its Consequences

The stylized facts identified in Section II show that exporting is associated with poor domestic market performance for financially vulnerable unsuccessful exporters; domestic revenue, domestic revenue growth, and the probability of staying in business all decrease after exporting for these firms. The after-exporting outcomes are stark when compared with those of financially constrained successful exporters. The theoretical model in Section III shows that export failure can result in poor domestic market performance for financially constrained firms; export

[29] It is not firm productivity, ϕ_i, exactly, but rather a transformation of firm productivity, $\phi_i^{\frac{\beta(\sigma-1)}{\beta-1}}$.

failure causes the less productive of these firms to: 1) become more financially constrained, 2) lower domestic revenue, and 3) have an increased probability of exiting the domestic market. The stylized facts and the model, however, are not enough to identify export failure as the cause of poor domestic market performance, poor domestic market performance as the cause of export failure, or a third factor as the cause of both outcomes. In this section, I derive a baseline empirical equation based on the theoretical model, and also eliminate as many alternative explanations as possible for the identified association.

IV.1 Baseline empirical specification

While it is clear that unsuccessful exporters do worse after exporting, there may be alternative explanations for some of the coincidences. First, the association may be due to some firm characteristic: productivity of a firm, production sector, experience with the foreign markets (e.g. an importer), or access to cheaper credit (e.g. a foreign invested enterprise). Such characteristics make firms more likely to succeed abroad and to also do better in the domestic market. Second, 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 association may merely show that firms export at peak domestic performance. If that is the case, it is only a coincidence that firms are growing fast before exporting and then growth slows or decreases after exporting. Likewise, maybe firms export after a positive productivity shock. So firms may seem healthier before exporting because of a positive shock and simply revert to their average after exporting. Finally, a firm

may also experience a negative productivity shock that coincides with exporting. For example, the year a firm exports foreign competitors experience a positive productivity shock that makes them more competitive in a third country—resulting in export failure for the domestic exporter—and also makes them more competitive in the home country—resulting in poor domestic market performance for all domestic firms.

I take several steps to eliminate some of the alternative explanations mentioned above. First, all regressions include firm fixed effects, and so all coefficients are estimated using within-firm variation. Firm fixed effects control for time-invariant firm characteristics. Regressions with domestic revenue growth as the outcome variable also include firm fixed effects, which additionally controls for firm-specific growth trends. The firm fixed effects represent the initial productivity draw from the theoretical model. Second, all regressions include calendar year dummies to deal with the economic environment affecting all firms equally in a given year. Finally, I focus on the difference-in-difference estimator to control for overall firm trends. Since the propositions that come out of the model assume everything else is constant, these steps help match the empirical estimates to the model.[30] I deal with time-varying, firm-specific shocks in a subsection below.

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

$$Y_{it} = \alpha_i + \delta_t + \beta_1 After_{it} + \beta_2 After_{it} \cdot Successful_i + u_{it} \tag{1.20}$$

[30]While these steps are not enough to establish causality, they do eliminate several alternative explanation and provide a better understanding of the association between domestic market performance and exporting.

In Equation (1.20), 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. As mentioned earlier, I include the following dependent variables: $log(Revenue_{it})$, 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 $Exit_i$, equals one if the firm exits before 2011, and zero otherwise. α_i is the firm fixed effects. δ_t are calendar year fixed effects. $After_{it}$ equal 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 captures characteristics specific to successful exports, the primary "control" group. $After_{it} \cdot Successful_i$ captures the difference between successful and unsuccessful exporters in the after-exporting periods.[31] Thus, β_2 is the difference-in-difference estimator and the estimate of interest. Lastly, u_{it} is the error term.

The predictions of the theoretic model are most clearly tested using the variable $log(Revenue_{it})$ as the outcome variable.[32] The model predicts that after exporting both successful and unsuccessful exporters that are financially constrained decrease domestic sales, $\beta_1 < 0$, but the decrease should be less for successful exporters, $\beta_2 > 0$. Although not shown 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 separate out the long-run term effects. Note that in

[31] Since the $log(Revenue_{it})$ and $\Delta log(Revenue_{it})$ estimates rely only on within-firm variation, the $Successful_i$ dummy is not included in the regression. It is, however, included in the $Exit_i$ regressions; as mentioned earlier, these estimates do not make use of the panel data.

[32] The $\Delta log(Revenue_{it})$ estimates might be more convincing as firm fixed effects in this case also control for firm specific growth trends.

the empirical results, I cannot distinguish between firms recovering from export failure or the average estimates being biased towards zero due to attrition.[33] The estimates might be biased downward if firms hurt most by export failure exit the market, and the estimates are identified only by the surviving firms. I also separate the immediate effects of exporting since there might be an immediate trade-off between domestic and export sales; decreases in domestic revenue the first year of exporting—when all firms export—might be fundamentally different than decreases in future periods. Because of these concerns, I do not estimate Equation (1.20), but instead split the $After_{it}$ dummy into three periods:

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

Here $After(t=0)_{it}$ equals one the first year firms export, and zero otherwise; I refer to this period as the short run. $After(t=1 \; to \; 5)_{it}$ equals one for the next five years, and zero otherwise; I refer to this period as the medium run. $After(rest)_{it}$ 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. β_{11} corresponds to the period when both successful and unsuccessful exporters export; I refer to this as the short-run effect of exporting. However, I am more interested in the estimates for β_{12} and β_{13}, the periods during which unsuccessful exporters supply only their domestic market. I refer to the β_{12} estimate as the medium-run effect of export failure and the β_{13} estimate as the long-run effect.

For similar reasons as those mentioned above, I also change the interaction

[33] I do, however, try alternative methods in an attempt to address these concerns, such as calculating the estimates from a Poisson regression and OLS estimates using level data. With these methods I can include zero revenue for firms that exit the domestic market.

term ($\beta_2 After_{it} \cdot Succ_i$); this term becomes:

$$\beta_{21} After(t=0)_{it} \cdot Succ_i + \beta_{22} After(t=1 \; to \; 5)_{it} \cdot Succ_i + \beta_{23} After(rest)_{it} \cdot Succ_i$$

These measure the short-run, medium-run, and long-run differences-in-difference between successful and unsuccessful exporters. The empirics will focus on these difference-in-difference estimates. Based on the theoretical model, I expect all of these to be positive. β_{21} might be positive due to capacity constraints.[34] However, if β_{22} and β_{23} are positive, this implies that unsuccessful exporters are worse off in the domestic market after exporting when compared with successful exporters. If capacity constraints were playing a dominant role, we might expect β_{22} and β_{23} to be negative, not positive as I find in the stylized facts and predict in the theoretical model.

Baseline estimates

To test the predictions of the model, I estimate modified Equation (1.20) with domestic revenue as the outcome variable. The results are shown in Model (1) of Table 1.3. I find that exporting for unsuccessful exporters is associated with a significant drop in domestic revenue; unsuccessful exporter decrease domestic revenue by 7 percent the first export year (the short run), 32 percent the following five years (the medium run), and 56 percent for the rest of the periods (the long run). More importantly the difference-in-difference estimator is large and significant; relative to successful exporters, unsuccessful exporter have domestic revenue that is 17 percent lower in the short run, 35 percent in the medium run, and 45

[34] 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.

percent in the long run. These estimates, however, do not differentiate between firms that are financially vulnerable and those that are not; as the theoretical model showed the effect of exporting should differ not only between successful and unsuccessful exporters but also between financially vulnerable ones.

Table 1.3: Baseline Estimates: All Data

Dependent →	Ln(Dom. Rev.)			ΔLn(Dom. Rev.)		
	(1)	(2)		(3)	(4)	
	Base	Base	Base*NFV	Base	Base	Base*NFV
Year of exp	-0.07**	-0.17***	0.21***	-0.16***	-0.24***	0.18***
	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.05)
After ($t = 1 - 5$)	-0.32***	-0.52***	0.43***	-0.19***	-0.22***	0.06
	(0.05)	(0.07)	(0.09)	(0.03)	(0.03)	(0.05)
After (rest)	-0.56***	-0.72***	0.38**	-0.15***	-0.20***	0.13**
	(0.09)	(0.11)	(0.16)	(0.04)	(0.05)	(0.06)
Successful*(Year of exp)	0.17***	0.12*	0.08	0.05	0.12**	-0.15**
	(0.04)	(0.06)	(0.08)	(0.03)	(0.05)	(0.07)
Successful*After($t = 1 - 5$)	0.35***	0.39***	-0.12	0.04	0.09**	-0.11**
	(0.06)	(0.09)	(0.11)	(0.03)	(0.04)	(0.06)
Successful*After(rest)	0.45***	0.44***	-0.03	-0.05	0.01	-0.13**
	(0.09)	(0.13)	(0.19)	(0.03)	(0.05)	(0.07)
Firm and year fixed effects	Yes	Yes		Yes	Yes	
Number of observations	16,161	16,161		15,381	15,381	
Number of clusters/groups	1,412	1,412		1,412	1,412	
Adjusted R^2	0.252	0.262		0.042	0.043	

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) equals 1 if the firm has a cash flow to total assets ratio greater than .07 (the median ratio for all firms).

The second specification in Table 1.3 better matches the theoretical model. In Model (2) I interact all of variables in the modified Equation (1.20) with a variable measuring financial vulnerability. As described in Section II.1, not financially vulnerable (NFV) equals one if the firm is not financially vulnerable at the time of exporting, and zero otherwise. These estimates show that the association between export failure and poor domestic market performance is stronger for financially vulnerable firms; for these firms domestic revenue decreases by 17 percent in the short run, by 52 percent in the medium run, and by 72 percent in the long run. Not all financially vulnerable firms react in the same way; successful exporters that are financially vulnerable are 12 percent better off in the short run than those that

fail, 39 percent in the medium run, and 44 percent in the long run. Furthermore, the negative association between export failure and domestic market performance is much weaker for unsuccessful exporters that are not financially vulnerable.

The triple difference estimator is not statistically significant in this regression. Note, however, that the estimates might suffer from attrition. If I correct for attrition by including zero domestic revenue for firms that exit the domestic market, the long run differences increase further;the triple differences are negative and significant in a Poisson regression.[35] Since the triple differences are negative, the differences between the four firm types increases after exporting.[36] This is consistent with the model since unsuccessful exporters that are not financially constrained should not be negatively affected by the export failure. At least not if financial constraints are the leading cause of the poor domestic performance observed in the data.

As an alternative measurement of domestic market performance I use domestic revenue growth. The results are shown in Models (3) and (4) of Table 1.3. Exporting is associated with a significant drop in domestic revenue growth for both successful and unsuccessful exporters. As seen in Model (3) unsuccessful exporters decrease domestic revenue growth by 16 percent in the short run, 19 percent in the medium run, and 15 percent in the long run. The differences between successful and unsuccessful exporters, however, are small and not statistically significant. These estimates change when interacting all variables in Model (3) with a variable measuring financial vulnerability. In Model (4), we see that the association

[35]See Appendix Table 1.A.5 for baseline levels and Poisson estimates and Appendix Table 1.A.6 for estimates excluding the largest firms.

[36]The four firm types are financially constrained unsuccessful exporter, financially unconstrained unsuccessful exporter, financially constrained successful exporter, and financially unconstrained successful exporter.

between export failure and poor domestic market performance is stronger for financially vulnerable firms; they decrease by 24 percent in the short run, 22 percent in the medium run, and 20 percent in the long run. The negative association between export failure and domestic market performance is much weaker for unsuccessful exporters that are not financially vulnerable. Similar to the previous results, not all financially vulnerable firms react the same; successful exporters are 12 percent better off in the short run, 9 percent in the medium run, and no statistically significant differences in the long run. The lack of significance in the long run may be because unsuccessful exporters recover or because the effects are masked over due to capacity constraints of successful exporters or to attrition in the data; all of these cases work against finding a significant difference.[37] The triple difference estimator is large and significant in these estimates.

Another—and perhaps more important—measurement of domestic market performance is the probability of staying in business. The results measuring the probability of exiting the domestic market underscore how the negative effects of exporting might be so large that they can lead to firms going out of business (see Table 1.4).[38] The regressions control for export value and various pre-exporting characteristics: firm industry, export cohort, revenue, revenue growth, short- and long-term debt, short- and long-term labor, short- and long-term investment, inventory, property, and intangibles. In the table, I show the estimates of interest and the estimates for control variables that are statistically significant; for example, I find that higher initial export value and higher long-term investment

[37]This was already shown for domestic revenue in Tables 1.A.5 and 1.A.6. For an alternative way to see how much attrition may be affecting my results, see Lee's treatment effect bounds (Lee, 2009) in Appendix Table 1.A.7.

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

Table 1.4: Exporting Increases the Probability of Going Out of Business

Dependent Var. ⇒ Exit	All	Survived SR	Surv. SR & MR
Successful	-0.32***	-0.26***	-0.02
	(0.03)	(0.04)	(0.02)
SuccessfulxNFV	0.09**	0.09*	-0.03
	(0.05)	(0.05)	(0.03)
Not Fin. Vulnerable (NFV)	-0.10***	-0.09**	0.02
	(0.04)	(0.04)	(0.02)
First Export Value$_{t=0}$	-0.00***	-0.00***	-0.00
	(0.00)	(0.00)	(0.00)
Avg. Short-Term Debt$_{t<0}$	0.02**	0.02*	0.01
	(0.01)	(0.01)	(0.01)
Avg. Long-Term Debt$_{t<0}$	0.02**	0.03**	0.01
	(0.01)	(0.01)	(0.01)
Avg. Long-Term Investment$_{t<0}$	-0.02*	-0.02**	-0.00
	(0.02)	(0.02)	(0.01)
Number of observations	1,240	1,192	1,013
Adjusted R^2	0.179	0.142	0.070

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parenthesis. The regressions also control for industry, export cohort, short-term labor, long-term labor, inventory, property, short-term debt, domestic revenue, and intangible.

decreases the probability of a firm exiting the domestic market, but higher short- and long-term debt increases the probability of firm exit. The estimates shows that even after controlling for these firm characteristics, financially vulnerable unsuccessful exporters are 10 percentage points more likely to exit the domestic market than their financially healthy counterparts. Likewise, these financially vulnerable unsuccessful exporters are 32 percent more likely to exit than their successful counterparts. If I restrict the sample to firms that produce in the medium run, the effect remains almost unchanged. However, the effect disappears if I restrict the sample to firms that produce in the long run. This may imply that if the firm survives the short and medium run, it can recover from any long-run effects.

IV.2 Propensity score matching

I match successful exporters and non-exporters to unsuccessful exporters to eliminate the possibility that the baseline estimates are biased because they fail to control for pre-exporting observables or because successful exporters are fundamentally different and thus not a good control group. In order to match unsuccessful exporters with non-exporters and successful exporters, I use nearest neighbor, propensity score matching (PSM).[39] I match non-exporters so that I can get an alternative control group and also to assign non-exporters an "after-exporting" period. I assign this period based on the match; that is, each non-exporter is assigned a pseudo exporting cohort based on the cohort of the unsuccessful exporter to which it was matched. With this match, I can then track non-exporters before and after the hypothetical exporting year and compare this trend with that of unsuccessful exporters. I follow a similar procedure to match successful exporters with unsuccessful ones. The difference is that for successful exporters I do not create an artificial after-exporting period; these firms already have an exporting cohort. Creating a matched successful exporting group does not fundamentally alter the results but it does control for pre-exporting observables.

Matching is based on a single index that captures all of the observable characteristics of the firm before it exported. The variables used to calculate the propensity score are revenue, revenue growth, cash flow/total assets, short- and long-term debt, short- and long-term labor, short- and long-term investment, in-

[39]PSM matching is used to reduce the dimensionality problem; matching along different dimensions without PSM would be extremely difficult. See Rosenbaum and Rubin (1983) for details. The propensity score matching strategy is to construct a counterfactual for unsuccessful exporters using non-exporters and successful exporters. Non-exporters, since they did not invest in exporting, might have invested in other business ventures and thus would be a better measurement of the opportunity costs of exporting.

ventory, property, and intangibles (intellectual property, patents, etc). Each of these is at the firm-year level. I match non-exporters and unsuccessful exporters based on the propensity score and force the match to be within the same start-up year and sector.[40] For successful exporters, I match based on observable characteristics, but do not force the match to be within the same start-up year and sector. With the matched sample, the only observable difference is either their decision to export, in the case of non-exporters, or in their export success, in the case of successful exporters.

Table 1.5: Matched Estimates: All Data

Dependent →	Ln(Dom. Rev.)			ΔLn(Dom. Rev.)		
	(1)	(2)		(3)	(4)	
	Base	Base	Base*NFV	Base	Base	Base*NFV
Year of Exp.	-0.09***	-0.20***	0.24***	-0.14***	-0.23***	0.20***
	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.05)
After ($t = 1 - 5$	-0.36***	-0.58***	0.47***	-0.18***	-0.21***	0.06
	(0.05)	(0.08)	(0.10)	(0.03)	(0.04)	(0.05)
After (*t=rest*)	-0.57***	-0.75***	0.42**	-0.14***	-0.19***	0.10*
	(0.10)	(0.11)	(0.18)	(0.04)	(0.05)	(0.06)
Successful*Year of Exp.	0.23***	-0.00	0.09	-0.00	0.07	-0.05
	(0.05)	(0.07)	(0.10)	(0.04)	(0.07)	(0.09)
Successful*After($t = 1 - 5$)	0.47***	0.31***	-0.22	0.04	0.12***	-0.11
	(0.07)	(0.11)	(0.14)	(0.03)	(0.05)	(0.07)
Successful*After(rest)	0.55***	0.36**	-0.29	-0.07*	0.11**	-0.19**
	(0.11)	(0.14)	(0.24)	(0.04)	(0.06)	(0.08)
Domestic*Year of Exp.	0.02	0.21***	-0.01	0.04	0.09	-0.19**
	(0.05)	(0.07)	(0.09)	(0.05)	(0.06)	(0.08)
Domestic*After($t = 1 - 5$)	0.19***	0.57***	-0.25*	0.07**	0.10**	-0.12*
	(0.07)	(0.11)	(0.13)	(0.03)	(0.05)	(0.06)
Domestic*After(rest)	0.22*	0.61***	-0.18	0.03	-0.01	-0.13*
	(0.11)	(0.15)	(0.22)	(0.04)	(0.06)	(0.07)
Firm and year fixed effects	Yes	Yes		Yes	Yes	
Number of observations	16,830	16,830		15,332	15,332	
Number of clusters/groups	1,473	1,473		1,473	1,473	
Adjusted R^2	0.252	0.260		0.033	0.034	

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) equals 1 if the firm has a cash flow to total assets ratio greater than .07 (the median ratio).

[40]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. Note that since the ordering of the data might affect a firm's match, I randomize the data before matching.

Propensity score matching estimates

In the PSM first stage, I estimate the probability of being an unsuccessful exporter, conditional on pre-exporting firm characteristics. To calculate the probability of being an unsuccessful exporter, I use the observable variables mentioned above. To get this propensity score for each firm, I regress the variables on the probability of being an unsuccessful exporters: $P(FAIL_i = 1)$. $FAIL_i$ equals one for unsuccessful exporters, and zero otherwise; it does not vary within a firm. Based on this propensity score, I perform 1-to-1 matching without replacement and impose a common support to find the match. This procedure matches firms in terms of observable, pre-exporting differences. 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. Furthermore, 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. Unsuccessful exporters with only two periods in the before-exporting period were matched last. The matching method ensures that at a minimum, all matches have data for at least two years before exporting and at least one year after exporting.

Having constructed the "control" groups using PSM, I then repeat the baseline estimation procedure. The only difference is that I have a matched-on-observable sample that includes non-exporters. Overall, successful exporters and non-exporters are better off than unsuccessful exporters, with successful exporters faring better (see Table 1.5).[41] In Model (1) we see matched estimates with log

[41]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 as the US is one of the primary export destinations.

domestic revenue as the outcome variable; unsuccessful exporters are worse off after exporting, and both successful and non-exporting firms fare better. Once I separate the financially vulnerable firms, in Model (2), we see that financially vulnerable failed exporters decrease domestic revenue by 20 percent in the short run, 58 percent in the medium run, and 75 percent in the long run.[42] Unsuccessful exporters that are not financially constrained also decrease, but by a lesser amount. Comparing financially constrained firms, non-exporters have domestic revenue that is 21 percent higher in the short run, 57 percent higher in the medium run, and 61 percent higher in the long run. Successful exporters have domestic revenue that is not statistically different in the short run, but 31 percent higher in the medium run and 36 percent higher in the long run. The triple differences are not statistically significant.

The results hold even when using domestic revenue growth as the outcome variable. While the differences-in-differences for the most part are not statistically significant (see Model 3 in Table 1.5), they become significant when separating out the financially vulnerable firms (see Model 4). The short-run difference-in-difference between the two control groups and unsuccessful exporters are positive, but not statically significant; this is consistent with the model as unsuccessful exporters have not yet failed. The medium-run difference-in-difference is about 10 percent for both successful and non-exporting firms. There are no statistically significant differences in the long run. Similar to the other results, the drop for unsuccessful exporters that are not financially vulnerable are smaller. Finally, the triple differences are negative and significant.

The matched $Exit_i$ results underscore how the negative effects of exporting

[42]For the Poisson and levels regression estimates see Appendix Table 1.A.8.

Table 1.6: Matched Estimates: Probability of Going Out of Business

Dependent ⇒ Exit	All	Survived SR	Surv. SR & MR
Successful	-0.31***	-0.26***	-0.03
	(0.04)	(0.04)	(0.02)
SuccessfulxNFV	0.08	0.07	-0.02
	(0.05)	(0.05)	(0.03)
Domestic	-0.06*	-0.07*	-0.00
	(0.04)	(0.04)	(0.03)
DomesticxNFV	0.00	0.02	-0.02
	(0.05)	(0.05)	(0.03)
Not Fin. Vulnerable (NFV)	-0.10***	-0.09**	0.01
	(0.04)	(0.04)	(0.02)
Avg. Domestic Revenue$_{t<0}$	-0.03***	-0.02**	-0.01
	(0.01)	(0.01)	(0.01)
Avg. Short-Term Debt$_{t<0}$	0.02*	0.02	0.01
	(0.01)	(0.01)	(0.01)
Avg. Short-Term Investment$_{t<0}$	0.11***	0.12***	0.03
	(0.03)	(0.03)	(0.03)
Number of observations	1,468	1,391	1,165
Adjusted R^2	0.197	0.175	0.105

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parenthesis. The regressions also control for industry, export cohort match, short-term labor, long-term labor, inventory, property, Long-Term Investment, Long-Term Debt, and intangible.

might be large and may lead to firm exiting domestic production (see Table 1.6). Model (1) shows that even after controlling for the same numerous pre-exporting variables as in Table 1.4, financially vulnerable unsuccessful exporters are 31 percentage points more likely to exit the domestic market than successful ones and 6 percentage points more than non-exporting firms. Likewise, these financially vulnerable firms are 10 percentage points more likely to stop producing than their non-financially vulnerable exporting counterparts. If I restrict the sample to firms that produce in the medium run (Model 2), the effects remain almost unchanged. The effect disappears if I restrict the sample to firms that produce in the long run (Model 3). For the matched data, increases in short-term debt and short-term investment increase the probability of the firm exiting, and increases in domestic revenue decrease the probability of exiting.

IV.3 Instrumenting for export success

Are successful exporters systematically different than unsuccessful exporters even after controlling for firm fixed effects and observable, pre-exporting characteristics? Does the same concern apply for financially vulnerable firms? It may be, for example, that financially vulnerable unsuccessful exporters experience a negative productivity shock that coincides with exporting. This shock would also explain the association found in the data. If so, even matched successful exporters are not a good counterfactual for unsuccessful exporters and the results found above may have an omitted variable bias. To correct for possible biases created by time-varying omitted variables that are correlated with with export failure, I must instrument for two endogenous variables: export success and financial vulnerability. In this paper, I have only one instrument but two endogenous variables. To get around this problem, I leave out the difference between financially constrained firms and instrument only for export success. However, as shown in the previous results, not separating financially vulnerable firms hides the association between export failure and poor domestic market outcomes; so finding differences between successful and unsuccessful exporters without separating financially vulnerable firms is encouraging.

A valid instrument must explain at least part of the variation in export success between firms, but also have no effect on firm-level outcomes other than through export success or failure. The instrument used for export success is the change in a firm's "world import market" between the year it first exports and the following year.[43] The world import market for a firm exporting variety i (at the HS-1996,

[43]I use growth, not log growth, to calculate market changes because of the low values for F-tests of excluded instruments using log growth.

Table 1.7: First-Stage Regressions for Market Changes as a Instrument

Dependent Var. →	A(0)*Suc	A(1 − 5)*Suc	A(> 5)*Suc	A(0)*Suc	A(1 − 5)*Suc	A(> 5)*Suc
A($t = 0$)	0.58***	-0.01***	-0.00	0.58***	-0.01***	-0.00*
	(0.02)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
A($t = 1 - 5$)	0.01**	0.62***	-0.00	0.01**	0.61***	-0.00
	(0.00)	(0.02)	(0.00)	(0.00)	(0.02)	(0.00)
A($rest$)	0.01	-0.02	0.76***	0.00	-0.04**	0.76***
	(0.00)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
A($t = 0$)*IV	-0.002***	0.0002**	-0.00002	-0.002***	0.0002	-0.00002
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
A($t = 1 - 5$)*IV	0.0002	-0.00***	-0.00002	0.0001	-0.002***	-0.00003
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
A($rest$)*IV	-0.002	-0.01	0.015	-0.002	-0.01	0.02
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
Observations	10,207	10,207	10,207	9,581	9,581	9,581
Adjusted R2	0.542	0.613	0.735	0.542	0.613	0.734
Second-stage	ln(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. Angrist-Pischke multivariate F test of excluded instruments for Log(dom. Rev.)/ Δlog(dom. Rev.): Successful*(Year of exp) = 48.44/45.27, Successful*After($t = 1 - 5$) = 12.54/12.04, Successful*After(rest) = 1.1/1.34.

six-digit product level) to Country f is Country f's total imports of variety i from the world minus imports from Colombia at time t.[44] Changes in the world import market should affect whether a firm continues to supply the foreign market beyond one year, but should not be correlated with domestic market performance. The instrument has product, destination, and year variation; it does not vary within a firm. This instrument is similar to that used in Hummels et al. (2014). As explained in that paper, an increase in world imports could result from a demand shock (either though consumer preference or firm input use) or from a supply shock (for example, a loss of comparative advantage by Country f in variety i).

Instrumental Variable estimates

For the world import market to be a valid instrument, it must satisfy both the inclusion and exclusion restrictions. Testing whether or not the IV satisfies the inclusion restriction is fairly straightforward; we can see in the first-stage regression results that the inclusion restriction is satisfied (see Table 1.7). Note that 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 periods; that is, I instrument for the short-run, medium-run and long-run difference-in-difference variables. I instrument for these difference-in-difference variables using the interactions between the three periods and the instrument for successful exporters; see Wooldridge (2008) for details on the estimation procedure. The first stage regressions have high F-tests and show that export success is indeed correlated with market changes. The Angrist-Pischke multivariate F-tests for $After(t = 0) * Succ.$, $After(t = 1\ to\ 5) * Succ.$, and

[44] I only have data to create the instrument for the 2000–2011 period, so the data sample is much smaller for the IV estimates than for the other estimates.

$After(rest) * Succ.$, are about 45, 12, and 1, respectively.[45] The first-stage estimates also show that the instrument is overall significantly correlated with export success and that the correlation decreases both in terms of size and significance for the long-run difference-in-difference estimates.

Table 1.8: IV Estimates

Dependent Var. →	Ln(Dom. Rev.)	ΔLn(Dom. Rev.)
Year of exp	-0.13*	-0.31***
	(0.08)	(0.11)
After($t = 1 - 5$)	-0.66***	-0.60***
	(0.25)	(0.17)
After(rest)	0.23	-0.03
	(1.88)	(0.72)
Successful*Year of exp	0.26*	0.32
	(0.14)	(0.20)
Successful*After($t = 1 - 5$)	0.90**	0.74***
	(0.40)	(0.28)
Successful*After(rest)	-0.60	-0.16
	(2.48)	(0.96)
Firm and year fixed effects	Yes	Yes
Number of observations	10,207	9,581
Number of clusters/groups	904	904

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.

To satisfy the exclusion restriction, the error term must not be correlated with the changes in foreign markets. It is unlikely that a new exporter can affect market changes in its world import market. While the shocks are exogenous to the firm, 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 domestic market. Likewise, there are issues with the instrument if the world import market is correlated with the domestic market.

[45]The F-test differ slightly depending on whether the outcome variables is domestic revenue or domestic revenue growth. The reason for this difference is that the number of observations is different depending on the outcome variable.

Since I control for year fixed effect, this is only an issue if the shocks and correlation are industry specific. For example, a positive shock to industry producers in the rest of the world may make domestic firms less likely to continue exporting in a foreign country and also to experience a negative shock in the home market. Another problem not addressed by this instrument is that exporting might be associated with learning-by-doing; if learning-by-exporting exists—something that is disputed—export success would cause better domestic market performance and focusing on the difference-in-difference estimate to test the effects of export failure is not appropriate.

After instrumenting for successful exporters, much of the difference between successful and unsuccessful exporters in the first year of exporting disappears (see Table 1.8). This might be expected since in that period both types of firms export; the difference should be seen after export success is determined, in the medium and long run.[46] I find that in the medium run, there is a significant difference between successful and unsuccessful exporters. In those years, unsuccessful exporters, relative to successful ones, have much lower domestic revenue and domestic revenue growth. There are no statistically significant differences in the long run.

Finally, the significance of the results using *Exit* as a dependent variable also do not change much if I use an instrumental variable approach (see Table 1.9). Unsuccessful exporters are more likely to exit the domestic market than successful ones, but this difference disappears if the firm manages to survive beyond the medium run.

[46] Alternatively we might expect there to be a difference in the short run; while no firm has "failed" at exporting in this period, some firms might be in the process of failing.

Table 1.9: IV Estimates: Probability of Going Out of Business

	All	Survived SR	Survived SR and MR
First Stage(Dependent var. ⇒ Successful)			
Market Change	-0.0016***	-0.0017***	0.0005
	(0.0005)	(0.0005)	(0.0088)
Second Stage (Dependent var. ⇒ Exit)			
Successful	-1.80***	-1.78***	4.96
	(0.52)	(0.50)	(89.64)
Number of observations	904	870	720

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parenthesis. The regressions control for export value and various pre-exporting characteristics: firm industry, export cohort, revenue, revenue growth, short- and long-term debt, short- and long-term labor, sort- and long-term investment, inventory, property, and intangibles.

V Conclusion

Policymakers in developing countries often emphasize the importance of domestic firms entering foreign markets. They spend precious government resources trying to gain foreign access and implement numerous export-promoting programs. However, the reality is that most firms fail in the export market, and do so rapidly. Yet little is known about what happens to these firms after they fail at exporting. For these firms, exporting in the hopes of "making it big" likely resulted in heavy profit losses. Despite this, trade literature often views exporting as a harmless exercise based on a simple cost-benefit analysis of foreign profits. This rationale ignores any effects export failure may have on domestic operations; for example, combining export failure with financial frictions may result in lower financing, decreasing domestic sales, lowering product quality, and even causing the sudden death of a firm.

The focus of this paper is on unsuccessful exporters and the costs of export failure. 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, 2) force constrained firms to limit their marketing expenditure and, hence, decrease domestic sales, and 3) make some firms more likely to default. Using Colombian firm-level data I test the propositions of the model. The empirical results show that after exporting, unsuccessful exporters that are financially constrained have a higher probability of exiting the domestic market, and those that survive have lower domestic revenue growth and lower domestic revenue; these results are robust to various identification strategies, including comparisons with similar successful exporters and non-exporter. No paper, to my knowledge, focuses on unsuccessful exporters after they exit the foreign market nor attempts to quantify the costs 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. The policy implication of this finding is that to increase exports policymakers should focus beyond market entry and lowering foreign trade barriers. Specifically, firms in developing countries would benefit from lowering the cost of export failure by, for example, lowering fixed export costs and decreasing export financing costs. Alternatively, these countries would benefit from lowering the probability of export failure by lowering the cost of finding a good foreign match. These two policy implications are already implemented in some developed countries. In the U.S., for example, the International Trade Administration helps American firms find foreign partners by providing market advice, organizing meetings with potential partners, and even arranging meeting space and translators. Additionally the Export-Import Bank in the U.S. provides favorable financing options to exporters.

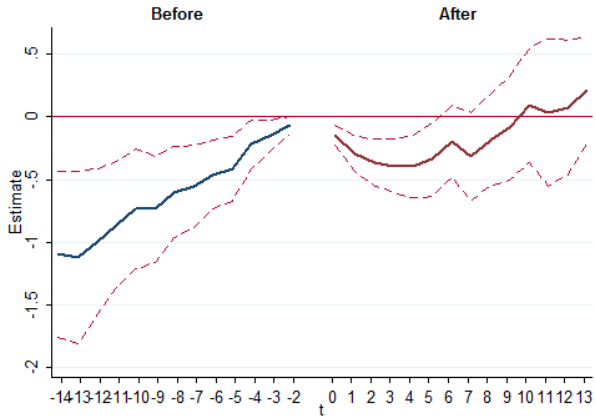
There are several ways to expand this work. The first is to exploit the product

information in the data; it may be that the negative effects found in this paper are lower for firms producing homogeneous goods or in established exporting sectors. The second is to exploit the destination variation; the fixed costs of exporting should vary by initial export destination, and so should the costs of export failure. Fixed export costs may be lower for firms exporting to a neighboring country than for a firm exporting to a far away or developed country. I address both in the next chapter. The third is to focus on continuous exporters rather than new exporters; I can analyze the consequences of trying to enter an additional foreign market and failing. Finally, as the long-run equilibrium implications of my findings are not clear, I plan to increase the scope of the research by analyzing the long-run equilibrium effects of export failure. I will do this by analyzing export failure in a general equilibrium framework where I model how export failure affects the number of exporter and aggregate exports. I want to test the hypothesis that at the country level export failure costs hamper gains from trade liberalization.

A Appendix

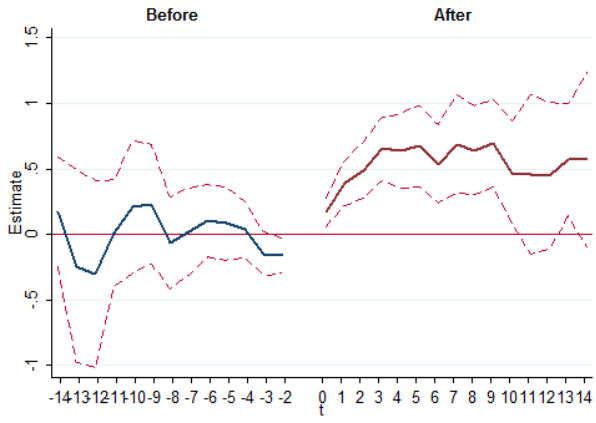
A.1 Appendix Figures

Figure 1.A.1: Ln(Domestic Revenue): Unsuccessful Exporters (Financially Constrained Firms)



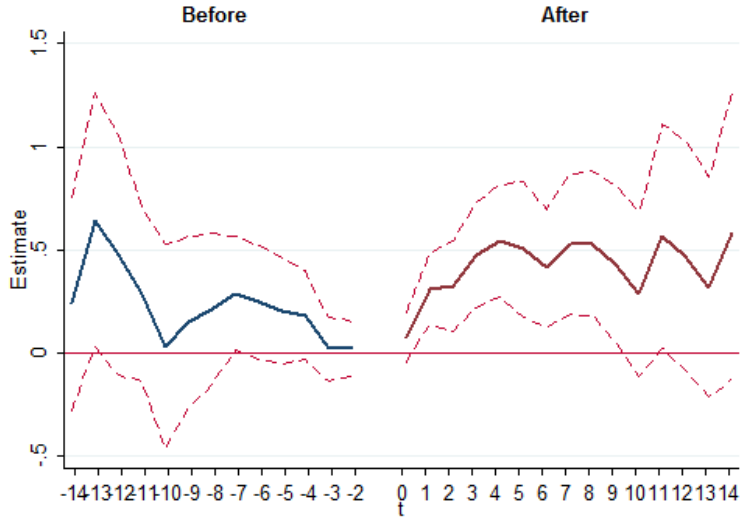
Note: Regression includes firm fixed effects and year fixed effects. The periods are interacted with not financially constrained, non-exporters, and successful exporters. The omitted group is constrained, unsuccessful exporters at time $t = -1$.

Figure 1.A.2: Ln(Domestic Revenue): Unsuccessful vs. Successful Exporters (Financially Constrained Firms)



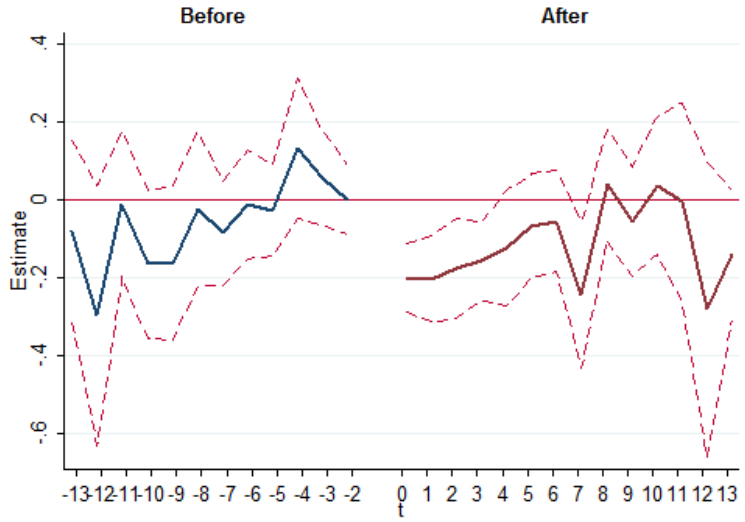
Note: Regression includes firm fixed effects and year fixed effects. The periods are interacted with not financially constrained, non-exporters, and successful exporters. The omitted group is constrained, unsuccessful exporters at time $t = -1$.

Figure 1.A.3: Ln(Domestic Revenue): Unsuccessful Exporters vs. Non-Exporters (Financially Constrained Firms)



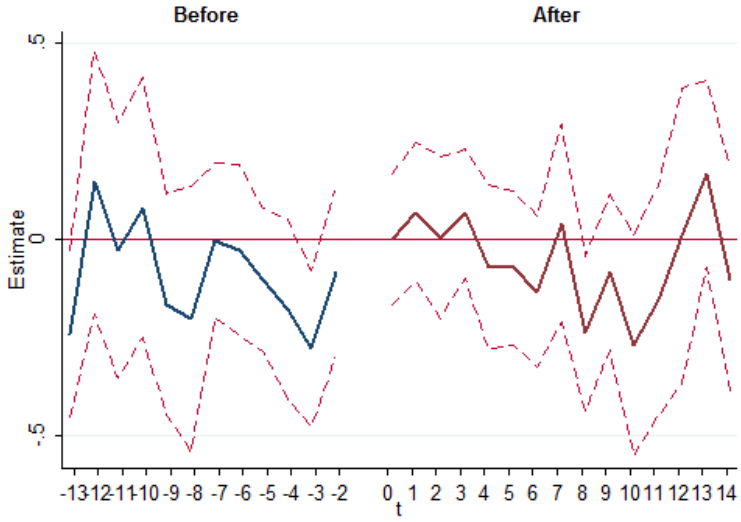
Note: Regression includes firm fixed effects and year fixed effects. The periods are interacted with not financially constrained, non-exporters, and successful exporters. The omitted group is constrained, unsuccessful exporters at time $t = -1$.

Figure 1.A.4: ΔLn(Dom. Revenue) for Unsuccessful Exporters (Financially Constrained Firms)



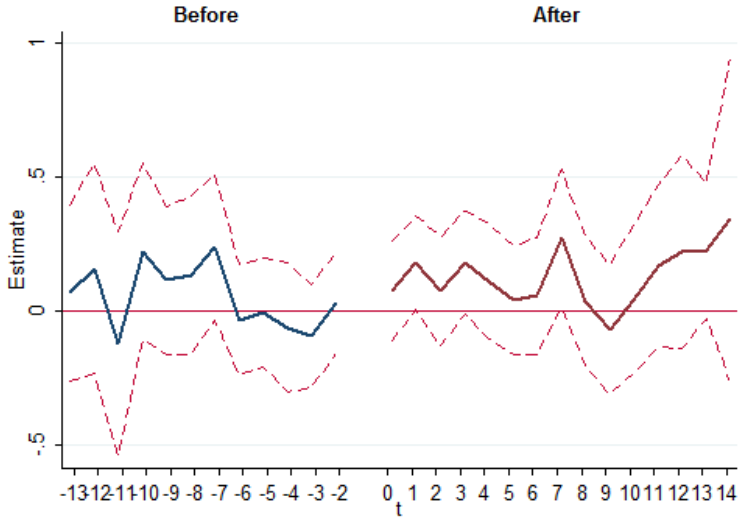
Note: Regression includes firm fixed effects and year fixed effects. The periods are interacted with not financially constrained, non-exporters, and successful exporters. The omitted group is constrained, unsuccessful exporters at time $t = -1$.

Figure 1.A.5: ΔLn(Dom. Revenue): Unsuccessful vs. Successful Exporters (Financially Constrained Firms)



Note: Regression includes firm fixed effects and year fixed effects. The periods are interacted with not financially constrained, non-exporters, and successful exporters. The omitted group is constrained, unsuccessful exporters at time $t = -1$.

Figure 1.A.6: ΔLn(Dom. Revenue): Unsuccessful Exporters vs. Non-Exporters (Financially Constrained Firms)



Note: Regression includes firm fixed effects and year fixed effects. The periods are interacted with not financially constrained, non-exporters, and successful exporters. The omitted group is constrained, unsuccessful exporters at time $t = -1$.

A.2 Appendix Tables

Table 1.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 1.A.2: 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 National Directorate of Taxes and Customs (DIAN) and Superintendencia de Sociedades.

Table 1.A.3: 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 1.A.4: Probability of Exit: Linear Probability Model

	After Exporting: Dependent = Enter		Before Exporting: Dependent = Exit	
	(1)	(2)	(3)	(4)
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.

Table 1.A.5: Baseline Estimates: All Data

Dependent=Domestic Revenue	Poisson			Levels (2 billion Pesos)		
	(1)	(2)		(3)	(4)	
	Base	Base	Base*NFV	Base	Base	Base*NFV
Year of exp	0.21**	0.25*	-0.12	1.23	2.57	-2.88
	(0.10)	(0.15)	(0.16)	(1.73)	(3.54)	(3.94)
After ($t = 1 - 5$)	0.14	0.05	0.22	0.23	0.97	-1.63
	(0.21)	(0.32)	(0.41)	(3.26)	(6.18)	(7.42)
After (rest)	-0.31	-0.49	0.48	-7.66***	-7.71	0.44
	(0.26)	(0.45)	(0.51)	(2.66)	(4.95)	(6.64)
Successful*(Year of exp)	0.03	-0.08	0.23	0.94	-1.15	4.23
	(0.11)	(0.17)	(0.19)	(2.00)	(3.80)	(4.11)
Successful*After($t = 1 - 5$)	0.19	0.21	-0.10	3.96	1.07	5.67
	(0.23)	(0.38)	(0.45)	(4.38)	(7.08)	(8.31)
Successful*After(rest)	0.57*	0.58	-0.20	11.10**	7.25	7.32
	(0.31)	(0.50)	(0.56)	(4.57)	(6.59)	(8.53)
Number of observations	18,741	18,741		18,741	18,741	
Groups	1,412	1,412		1,412	1,412	
Cluster by Group	No	No		Yes	Yes	
Adjusted R^2				0.019	0.019	

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) equals 1 if the firm has a cash flow to total assets ratio greater than .07 (the median ratio for all firms).

Table 1.A.6: Baseline Estimates: Dropping Firms with Revenues above 1 trillion or More Pesos

Dependent=Domestic Revenue	Poisson			Levels (2 billion Pesos)		
	(1)	(2)		(3)	(4)	
	Base	Base	Base*NFV	Base	Base	Base*NFV
Year of exp	0.07	0.01	0.11	-0.69	-1.28*	1.08
	(0.05)	(0.07)	(0.08)	(0.62)	(0.66)	(0.84)
After ($t = 1 - 5$)	-0.07	-0.50***	0.80***	-2.87*	-5.51***	5.53*
	(0.19)	(0.18)	(0.29)	(1.62)	(1.25)	(2.96)
After (rest)	-0.57***	-1.12***	1.17***	-9.84***	-12.80***	6.91***
	(0.22)	(0.27)	(0.33)	(1.98)	(2.07)	(2.54)
Successful*(Year of exp)	0.15**	0.15	-0.03	2.56***	2.36*	0.31
	(0.06)	(0.10)	(0.12)	(0.86)	(1.24)	(1.65)
Successful*After($t = 1 - 5$)	0.36*	0.75***	-0.76**	5.51***	7.20***	-3.88
	(0.20)	(0.25)	(0.34)	(2.06)	(2.79)	(4.04)
Successful*After(rest)	0.78***	1.23***	-1.02***	12.16***	12.97***	-2.74
	(0.23)	(0.31)	(0.38)	(2.28)	(2.83)	(4.50)
Number of observations	18,718	18,718		18,718	18,718	
Groups	1,410	1,410		1,410	1,410	
Cluster by Group	No	No		Yes	Yes	
Adjusted R^2				0.040	0.042	

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) equals 1 if the firm has a cash flow to total assets ratio greater than .07 (the median ratio for all firms).

Table 1.A.7: Domestic Revenue Growth: Lee's bounds for Attrition

Dependent =	FD OLS	Lee's bounds (LB)		Observations	
Δln(Revenue)	Successful*After	lower	upper	OLS	LB
After 2 year	0.25***	0.11***	0.40***	1,334	1,412
	(0.05)	(0.04)	(0.04)		
After 3 year	0.25***	0.02	0.52***	1,281	1,412
	(0.06)	(0.05)	(0.05)		
After 5 year	0.29***	-0.50***	1.04***	952	1,412
	(0.08)	(0.10)	(0.09)		
After 10 year	0.50***	-1.62***	2.27***	431	1,412
	(0.15)	(0.29)	(0.25)		

note: $***p < 0.01, **p < 0.05, *p < 0.1$ Robust standard errors for OLS estimates and bootstrapped standard error for leebounds estimates; data demeaned by year. Dependent = ln(Domestic Revenue X years after exporting) − ln(domestic revenue on year before exporting). Attrition may affects the results and the assumption made about the missing data determines the sign of the effect.

Table 1.A.8: Matched Estimates: All Data

Dependent=Domestic Revenue	Poisson			Levels (2 billion Pesos)		
	Base	Base	Base*NFV	Base	Base	Base*NFV
Year of Exp.	0.05	0.01	0.07	-0.18	-0.31	0.20
	(0.05)	(0.07)	(0.08)	(0.60)	(0.72)	(0.80)
After ($t = 1 - 5$)	-0.30**	-0.55***	0.50**	-3.15***	-4.32***	2.43*
	(0.12)	(0.18)	(0.20)	(0.95)	(1.25)	(1.46)
After (rest)	-0.74***	-1.19***	0.97***	-8.52***	-10.60***	5.13**
	(0.19)	(0.27)	(0.31)	(1.61)	(1.83)	(2.21)
Successful*Year of Exp.	0.18***	0.22**	-0.08	2.76***	3.53**	-1.42
	(0.07)	(0.10)	(0.13)	(1.03)	(1.69)	(2.05)
Successful*After($t = 1 - 5$)	0.71***	0.99***	-0.58*	10.61***	11.89***	-2.71
	(0.16)	(0.27)	(0.31)	(3.39)	(4.44)	(6.23)
Successful*After(rest)	1.13***	1.48***	-0.81**	19.53***	20.92***	-3.83
	(0.23)	(0.32)	(0.41)	(4.53)	(4.78)	(8.93)
Domestic*Year of Exp.	0.00	-0.13	0.24*	-0.42	-1.58**	2.87**
	(0.07)	(0.09)	(0.12)	(0.61)	(0.64)	(1.33)
Domestic*After($t = 1 - 5$)	0.36**	0.48*	-0.28	1.62	1.54	0.56
	(0.17)	(0.29)	(0.34)	(1.30)	(1.67)	(2.64)
Domestic*After(t=rest)	0.59**	0.93**	-0.78*	3.11*	4.03*	-2.16
	(0.25)	(0.36)	(0.42)	(1.71)	(2.19)	(3.39)
Number of observations	19,259	19,259		19,259	19,259	
Groups	1,473	1,473		1,473	1,473	
Cluster by Group	No	No		Yes	Yes	
Adjusted R^2				0.023	0.023	

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) equals 1 if the firm has a cash flow to total assets ratio greater than .07 (the median ratio for all firms).

A.3 Theoretical Proofs and Extensions

A.3.a General Case: Successful Exporters

Unconstrained threshold for successful exporters: 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:

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

Substituting in L^*_{ih} from Equation (1.8) and the profit-maximizing L^*_{if}, we get the following condition:

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

Simplifying: $\phi_C^{succ} =$

$$\mu\left(\frac{1}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}}\left(\frac{f_x+f_d-(1-\lambda)f_e}{\lambda\beta-1}\right)^{\frac{1-\beta}{\beta(1-\sigma)}}\left(y_h^{\frac{\beta}{\beta-1}}\left(\frac{1}{P_h}\right)^{\frac{\beta(1-\sigma)}{\beta-1}}+y_f^{\frac{\beta}{\beta-1}}\left(\frac{\tau_{if}}{P_f}\right)^{\frac{\beta(1-\sigma)}{\beta-1}}\right)^{-\frac{1-\beta}{\beta(1-\sigma)}}$$

Note that here 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 times the iceberg trade costs ($P_f = P_h \cdot \tau_{if}$), then the above equation simplifies to:

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

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:

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

Subject to the binding financing constraint:

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

Using ε as the multiplier, we get:

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

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

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

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

$$\left(\frac{L_{ih} Y_h}{\sigma} \left(\frac{\mu}{P_h \phi}\right)^{1-\sigma} - \frac{L_{ih}^{\beta}}{\lambda}\right) \left(1 + \left(\frac{Y_f}{Y_h}\right)^{\frac{\beta}{\beta-1}} \left(\frac{P_h \tau_{if}}{P_f}\right)^{\frac{\beta(1-\sigma)}{\beta-1}}\right)$$

$$= \frac{f_x + f_d - (1-\lambda) f_e}{\lambda}$$

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

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

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

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

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.

A.3.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 successful and unsuccessful exporters, individually, with non-exporters.

To prove that the threshold for unsuccessful exporters is higher after the export attempt ($\phi_C^{dom} < \phi_C^{fail}$), Equation (1.9) must be bigger than Equation (1.10). This holds as long as $f_x > 0$. Notice also that the threshold is higher the higher the f_x ($\frac{\partial \phi_C}{\partial f_x} > 0$). 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 required for an interior pricing solution; and we have that $f_x + f_d > (1-\lambda)f_e$ and $\lambda\beta > 1$ by Assumption 1.

To prove that the threshold for successful exporters is higher after exporting ($\phi_C^{dom} < \phi_C^{succ}$), we need Equation (1.11) to be larger than Equation (1.10). This holds as long as $f_d - f_x < (1-\lambda)f_e$. This must hold since $(1-\lambda)f_e > 0$ and, by Assumption 2, we have that $f_x > f_d$. 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 1.11) and unsuccessful exporters (Equation 1.9). 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 $(1-\lambda)f_e < f_x + f_d$ by Assumption 1. The difference is decreasing with τ_{if}, holding everything else equal. Thus, the financially constrained threshold difference between successful and unsuccessful exporters is greatest with smaller iceberg trade costs. The difference between successful and unsuccessful newly financially constrained exporters is that while both are worse off in terms of domestic revenue, successful exporters are better off because they have foreign revenue.

A.3.c 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: $\frac{L_i Y}{\sigma}\left(\frac{\mu}{P\phi}\right)^{1-\sigma} - \frac{L_i^{\beta}}{\lambda}$ (see Equation 1.12 for the unsuccessful exporter choice, Equation 1.13 for the domestic producer choice, and Equation 1.14 for the successful exporter choice). The right hand side differs, but it does not vary by productivity or marketing choice; changes in productivity only change the marketing choice after export success has been determined. Thus, 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:

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

This is positive since $\sigma - 1 > 0$, $\sigma > 1$, and $\frac{\beta L_i^{\beta-1}}{\lambda} > \frac{Y}{\sigma}\left(\frac{\mu}{P\phi}\right)^{1-\sigma}$. Notice that $\frac{Y}{\sigma}\left(\frac{\mu}{P\phi}\right)^{1-\sigma}$ 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 marginal cost, $\beta L_i^{\beta-1}$, equal to the marginal revenue of marketing, $\frac{Y}{\sigma}\left(\frac{\mu}{P\phi}\right)^{1-\sigma}$. Marginal cost is below the marginal cost of borrowing for marketing, $\frac{\beta L_i^{\beta-1}}{\lambda}$. With no financial frictions, $\lambda = 1$, the two marginal costs equal. For financially unconstrained firms, marginal revenue from marketing is less than the marginal cost from marketing. 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 also means lower expected profits, so the firms deviate as little as possible. 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 last firm to produce is the one that in order to borrow 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 $\left(\frac{\beta L_i^{\beta-1}}{\lambda} \geq \frac{Y}{\sigma}\left(\frac{\mu}{P\phi}\right)^{1-\sigma}\right)$ and only unconstrained firms set marginal cost of marketing equal to marginal revenue of marketing $\left(\beta L_i^{\beta-1} = \frac{Y}{\sigma}\left(\frac{\mu}{P\phi}\right)^{1-\sigma}\right)$.

A.3.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 they attempted to export. Thus, to prove the first part of the proposition, I compare successful and unsuc-

cessful exporters, individually, with non-exporters.

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 (1.12). 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 $f_d - (1 - \lambda)f_e < f_x + f_d - (1 - \lambda)f_e$. Since $0 < f_x$, then $L^{dom} > L^{fail}$. Alternatively, we can also note that $\frac{\partial L_i}{\partial f_x} < 0$. Thus, if $\frac{\partial RHS_i}{\partial f_x} > 0$ in the same equation, then $\frac{\partial L_i}{\partial f_x} < 0$. Taking the derivative of the right hand side with respect to f_x, we get $\frac{\partial RHS_i}{\partial f_x} = \frac{1}{\lambda} > 0$, so $\frac{\partial L_i}{\partial f_x} < 0$.

Whether or not L_i for constrained successful exporters is lower after exporting ($L^{dom} > L^{succ}$) depends on whether or not the new market loosens or tightens the constrained. If the markets are similar, then it is likely that entering the new market tightens the constraint. We can see if the new market constrains the successful firm by comparing Equations (1.13) and (1.14). For Equation (1.14), I assumed the firm enters a similar sized market ($Y_h = Y_f = Y$) with a price level equal to that of the domestic times the iceberg trade costs ($P_f = P_h \cdot \tau_{if}$). Then $L^{dom} > L^{succ}$ when

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

That is, when $f_d - f_x < (1-\lambda)f_e$. This is likely to be the case, since, by Assumption 2, $f_d < f_x$.

Proof for the second statement: We can prove that the constrained L_i is less for unsuccessful than successful exporters ($L^{fail} < L^{succ}$) from Equation (1.12) and Equation (1.14). In those equations we see that successful exporters are better

off as long as $\frac{1}{2}(f_x + f_d - (1-\lambda)f_e) < (f_x + f_d - (1-\lambda)f_e)$. Which, as we saw in Appendix A.3.b, is likely to hold.

A.3.e 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: $\frac{\partial \phi_0^{fail}}{\partial f_x} =$

$$\frac{\mu}{P}\left(\frac{Y}{\sigma\beta}\right)^{\frac{1}{(1-\sigma)}} \frac{1-\beta}{\beta(1-\sigma)} \lambda^{\frac{\beta}{1-\beta}} \frac{1}{\beta-1} \left(\lambda^{\frac{\beta}{1-\beta}} \frac{1}{\beta-1}(f_x + f_d - (1-\lambda)f_e)\right)^{\frac{1-\beta}{\beta(1-\sigma)}-1} > 0$$

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 ($\phi_0^{succ} < \phi_0^{fail}$).

Chapter 2

Export Expansions of Products and Destinations: Sequential Exporting by Colombian Firms

I Introduction

The availability of firm-level trade data has allowed us to identify several important stylized facts about exporters. For example, few firms export, the majority that do tend to export one product/destination, and export value is dominated by multi-product and multi-destination exporters (Bernard et al., 2007). In the US, only 4% of firms export; multi-destination firms account for 13.7% of exporters and 92.9% of export value; and multi-product firms account for 25.9% of exporters and 98% of export value. Additionally, the majority of firms-time exporters do not export beyond one year (Eaton et al., 2007) and first-time exporters tend to start small (Rauch and Watson, 2003). The leading explanation behind these stylized facts come from Albornoz et al. (2012). The authors find that sequential exporting explains why many new exporters quickly give up exporting and why

those that survive tend to expand beyond their original export market. According to the authors, firms do not know their own export competitiveness but they do know that it is positively correlated over time and across destinations. So firms that find they are not competitive abroad stop exporting and firms that continue to export are likely to increase sales and enter new markets.

The sequential exporting explanation has certain implications that have not been previously tested. The Albornoz et al. (2012) paper implies but does not test the following: 1) the majority of successful exporters expand beyond their original export market, 2) expansions beyond the original export market have high success rates, and 3) there are no negative consequences to export expansion failure. In this chapter, using Colombian firm-level export data, I answer the following questions: 1) are export expansions as successful and prevalent as the literature implies? and 2) are there negative consequences for unsuccessful expansions? These questions are important because they shed light on firm dynamics and help us understand the firm decision to expand beyond the original export market, the firm decision about how much to export to the original market, and the firm decision to altogether exit the export market.

There are many reasons why firms expand beyond their original export market. First, firms may be doing poorly in that market and will have to exit the export market unless they find a different market. Second, firms may be doing well, but think they will be more profitable by entering more markets. Irregardless of the reason, the effect of expansion failure on export performance in the original market is unclear. Expansion failure can have a positive affect if the firm improves its product or productivity by learning from the experience, resulting in higher sales in the original export market. Or the effect may be similar to that of export failure

(see Mora 2015). Firms may have to borrow in order to expand and if expansion fails, the firms will have more debt but no new revenue. For financially constraint firms, this failed investment may affect a firms borrowing capability and result in lower sales in the original export market. Additionally, the effect can still be negative for firms that are not financially constrained if expansion failure signals that the future potential of a firm is not as high as its investors believed. After the signal, investors could decrease their investment and sales decrease.

In this chapter, I find that there is a negative association between expansion failure and performance in the original export market. I do not differentiate between the financially-constrained channel and the signaling channel because of data limitations. The data used in this chapter lack domestic financial information, so I am unable to identify financially constrained firms and cannot distinguish if the observed poor market performance is because expansion failure affecting firms that are financially constraints or if expansion failure signaling to investors to lower investment in firms with failed expansions. Identifying the mechanism is important if one wants to provide policy recommendations. While I cannot differentiate between the two channels, I can eliminate some other alternative explanations for the observed association.

I start the analysis by observing firm behavior both before and after a firm expands beyond it original export market. I also analyze differences, both before and after an expansion attempt, between firm that fail at expanding and firms that succeed. I do this through an event study comparison. In the empirics section, I do a traditional difference-in-difference analysis comparing the performance of the two firm types in the original export market. I include an additional control group (firms that do not expand) using propensity score matching (PSM). The

observed differences is then the decision to expand (when comparing firms that do not expand with those that fail at expanding) or in the expansion success (when comparing firms that attempt to expand but differ in success).

I find that few continuous exporters—firms that export multiple years—expand to different products or to different destinations. Part of the hesitation to enter new markets may be due to the consequences of expansion failure mentioned above. Of those firms that do expand, many do not export to the new market for more than a year. I find that expansion failure is associated with poor performance in the original export market.[1] Specifically, I find that firms that fail at expanding—firms that export to a new market for only a year—have lower revenue, lower revenue growth, and a higher probability of going out of the export business after an expansion attempt. The findings are robust to comparison with firms that successfully expand. Compared with firms that do not expand, firms with failed expansions also have lower revenue and lower revenue growth; the effect on the probability of going out of the export business are mixed.

The work in this chapter most closely resembles the export survival literature (Mora, 2015; Besedeš and Prusa, 2011; Stirbat et al., 2013; Cadot et al., 2013; Esteve-Pérez et al., 2007; Tovar and Martínez, 2011). There are several key differences between that work and the work in this chapter. First, I focus on what happens after an export expansion, not on the probability of export survival. As such, I do not look into what makes a firm a successful exporter. The work most closely associate with this work is my previous work on export survival (Mora, 2015). In that chapter, I find that export failure is associated with poor domestic

[1] the original export market is defined as either the original destinations reached or original product bundle.

performance, especially for financially constrained firms. I argue that exporting should be treated more like a risky investment and the riskiness inherently involved in exporting explains why few firms enter the export market. Similarly, the consequences of expansion failure may explain why few firms expand beyond their original export market.

There are two key differences between this chapter and my previous one on export failure. First, I do not look into domestic market performance, but rather on the performance in the original export market. Second, I have a product element in this work where in contrast my export failure work only looked at expansions beyond the home market and lack data on the products sold in any market. Here I analyze when a firm expands in term of a destination or a product. Finally, the work here does not use domestic data and, thus, I have no measurement of financial constraints. In the previous chapter I found that financially constrained firms have the strongest association between poor domestic market performance and export failure. If the association is the same for firms that attempt to expand and fail, then finding in this work may underestimate the full effect of expansion failure for financially constrained firms.

This work aims to understand firm dyanamics and builds on similar literature. Topics in this literature includes trying to understand why few firms export (Bernard et al., 2007; Bernard and Jensen, 2004; Brooks, 2006); provide information on multi-product/destination firms (Bernard et al., 2007); how firms add or drop products (Goldberg, Khandelwal, Pavcnik, and Topalova, 2010; Bernard et al., 2011); why firms start small in the export market (Rauch and Watson, 2003); why they exhibit sequential exporting behavior (Albornoz et al., 2012); and why some firms upgrade their products (Manova and Zhang, 2012; Haus-

mann, Hwang, and Rodrik, 2007). I add to this literature by providing stylized facts about export expansions and to argue that export expansions are risky. Lastly, since this work also touches on why firms export/expand, it is in line with the firm heterogeneity literature (Melitz, 2003; Verhoogen, 2008; Melitz and Ottaviano, 2008; Bernard and Jensen, 2004; Bernard et al., 2007, 2011; Helpman et al., 2004).

The rest of the chapter is organized as follows. Section II describes the data and provides stylized facts about expansions beyond the original destination and original product bundle. Section III implements the identification strategy and provides robustness checks. Section IV concludes.

II Data Description and Stylized Facts

In this section, I describe the export data, provide summary statistics, and offer empirical motivation for the empirics. The event study analysis compares the original market performance—before and after either entering a new export destination or a new export product—of firms expanding at the same time, but differing in expansion success. The analysis identifies stylized facts about exporter expansions and presents a more complete picture of the association between original market performance and expansions beyond that market.

II.1 Data sources and sample

I use Colombian firm-level export data to analyze the link between export expansions and performance in the original foreign market. Using Colombian data for

this analysis is ideal for several reasons. First, the export data are broken down by firm, product, and destination. Second, these data provide a fairly long panel (16 years) that allow me to observe firm behavior several years before and after an expansion. Finally, since the data include the universe of Colombian exporters, I am fairly confident that when a firm disappear from the data sample it ceases to export. I cannot account for mergers and acquisitions; so it is possible that such firms may export under a different tax identifier.

The Colombian customs data come from the Colombian National Directorate of Taxes and Customs (DIAN) and includes firm-level exports for the 1994–2011 period. Each export transaction includes a firm tax identifier (which is time-invariant), a product code (at the 10-digit level), trading partner, and the free-on-board (FOB) export value in US dollars and Colombian pesos.[2] Although the data are at the transaction level, I aggregate it to the annual level. I do this because exporting is intrinsically discrete; aggregating eliminates seasonal fluctuation and accounts for the fact that some firms import infrequently to take advantage of economies of scale and to account for delivery lags (Alessandria et al., 2010).

To get the data sample used in this paper I first identify the firm's original export market. I calculate the original market in three ways: 1) based on the initial export destination, ignoring the products exported to those destinations; 2) based on the export product bundle, ignoring the destination of those products; and 3) based on the export product-destination pairs.[3] I classify firms as having unsuccessful expansions if a firm does not export to the new market beyond one

[2]Most of the estimats use US dollars, but the estimates do not significantly change if I use Colombian pesos.

[3]The empirics exclude the last sample because it has fewer observations and the difficulty finding matched firms.

year. However, I allow firms that have successful expansions to enter and exit the new export market. I exclude firms that do not have at least two periods before expanding and firms that do not export to the original market the year that they expand; thus, in my sample, at a minimum, all firms have one export revenue growth observation in the original market before exporting and one observation after. Note that this procedure means that all non-expanding firms are excluded from the baseline results; I include as many non-expanding firms as firms with unsuccessful expansions in the propensity score matching estimates. The 2011 expanding cohort is excluded since for these firms there is not enough information to calculate whether or not firms successfully expand into the new market. Since new exporters are the focus of this paper, I exclude firms already exporting in 1994, the first year the data is available. Finally, I also exclude firms with tax identifiers that do not conform to the standard nine-digit number.

Since I calculate the original market in three ways, I have three different data samples. For the destination as the original market, I end up with 12,870 firm-year observations, 1,291 firms successfully expand beyond this market and 518 firms fail in their destination expansions. For the product bundle as the original market, I end up with 12,782 firm-year observations, 1,389 firms successfully expand beyond this market and 458 firms fail in their product expansions. For the product-destination pairs as the original market, I end up with 6,641 firm-year observations and 1,039 firms: 430 firms successfully expand both their original product and destination; 62 firms fail expansions in both; 240 firms succeed in one (either product or destination) and do not attempt to expand in the other; 196 firms fail in one and do not attempt to expand in the other; and 111 firms fail in one and succeed in the other (see Table 2.1). Using product-destination as the original

market is more restrictive and results in fewer firms in the sample. The main reason for this difference is the restriction to have multiple observations in the original export market.[4]

Table 2.1: Tabulation of Firm Type for Product–Destination Sample

		Destination			
	Firm Type	None	Successful	Unsuccessful	Total
Prod.	None	2,530	131	76	2,737
	Successful	109	430	49	588
	Unsuccessful	120	62	62	244
	Total	2,759	623	187	3,569

Note: The product-destination sample measures the original sample based on the initial export product-destination pairs. These firms can expand beyond their original product or beyond their original destination. "None" is a firm that does not export beyond its original export market; "Successful" is a firm that exports beyond its original export market for two or more years; and "Unsuccessful" is a firm that exports beyond its original export market but only does so for one year.

Variable definitions

There are three main outcome variables: export revenue, export revenue growth, and the probability of exiting the original export market. Export revenue equals either export revenue in US dollars or the natural log of export revenue for firm i at time t. Export revenue growth for firm i at time t equals the difference in log export revenue between time t and $t-1$. Firm exit equals one if the firm exits the original export market, and zero otherwise.

[4]For example, if a firm exits the export product but not the export destination, it exits the original export market when I definite the export market as the destination-product, but not if I define it as destination. Such a firm may be included in the destination sample if it has the required number of observations. However, it may be excluded from the other data samples because it has too few observations in those original markets. A similar argument can be made for why destination-product is more restrictive that simply having the original market defined by the product.

The main covariates of interest are the following: firms that successfully expand (S_{it}) and firms that fail in their expansion attempt (U_{it}). U_{it} equals one for firms that attempt to expand beyond their original export market but fail to do so for more than a year, and zero otherwise. S_{it} equals one for firm that managed to expand beyond their original export market for more than a year, and zero otherwise.

II.2 Summary statistics

The trade data show that expansions beyond the original export market are rare. No matter how I define the original market, about three fourths of all firms in the sample stay in their original market and do not expand (see Table 2.2). In the destination-product sample, we see that expansions in products and expansions in destinations are highly correlated (see Table 2.1). 2,500 firms do not expand at all, but 1,039 do expand. Of those that expand, 603 firms attempt to expand beyond both in their original export product and destination, 229 attempt to expand beyond their original export product bundle, and 207 attempt to expand beyond their original export destination.[5]

II.3 Empirical motivation

I find that original export market performance is correlated with expanding beyond that market and the effect depends on whether or not the firm was successful at expanding. Looking at three outcome variables and using an event study anal-

[5]For an alternative measurement using cross-section data, rather than panel data, see Appendix Table 2.A.1. There we see that expansions are even more rare if I do not limit the sample by requiring that firms export for a certain minimum number of years.

Table 2.2: Number and Share of Firms by Data Sample

	Dest. Sample		Prod. Sample		Destination–Product Sample			
					Destination		Product	
Expansions	Num.	Share	Num.	Share	Num.	Share	Num.	Share
None	5,787	75.81	4,491	71.29	2,759	77.3	2,737	76.69
Successful	1,389	18.19	1,291	20.49	623	17.46	588	16.48
Unsuccessful	458	6.00	518	8.22	187	5.24	244	6.84
Total	7,634	100	30,278	100	3,569	100	3,569	100

Note: The samples are for three different definitions of the original market. The destination sample measures the original export market based on the initial export destination of a firm; the product sample measures the original export market based on the initial export product bundle; and the product-destination sample measures the original export market based on the initial export product-destination pairs. "None" is a firm that does not export beyond its original export market; "Successful" is a firm that exports beyond its original export market for two or more years; and "Unsuccessful" is a firm that exports beyond its original export market but only does so for one year.

ysis, I identify three stylized facts regarding export failure and domestic market performance. All of the figures show original market performance in the domestic market relative to the period before exporting ($t = -1$) for firms with a failed expansion attempt.[6]

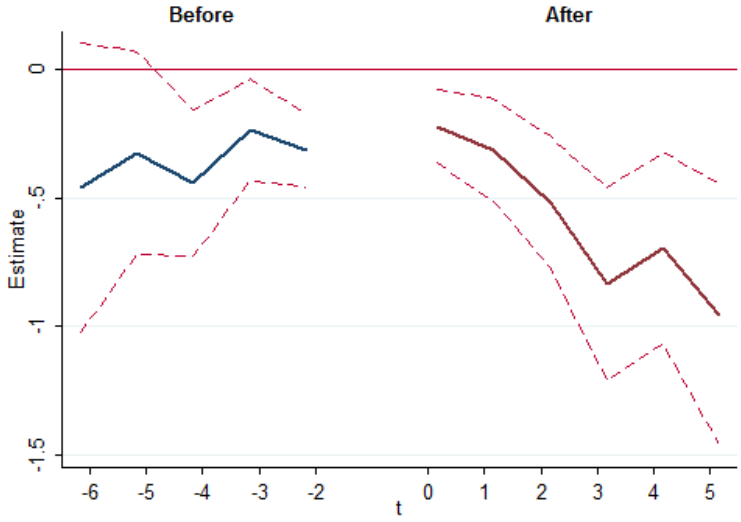
The first stylized fact is that export expansions, be it in product or in destination, are associated with a sharp drop in export revenue in the original export

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

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

The regression includes firm fixed effects (α_i) and calendar year fixed effects (δ_t). N is either the number of years before an expansion attempt or the number of years after an expansion attempt.

Figure 2.1: Ln(Export Revenue): Unsuccessful Expansion in Destination



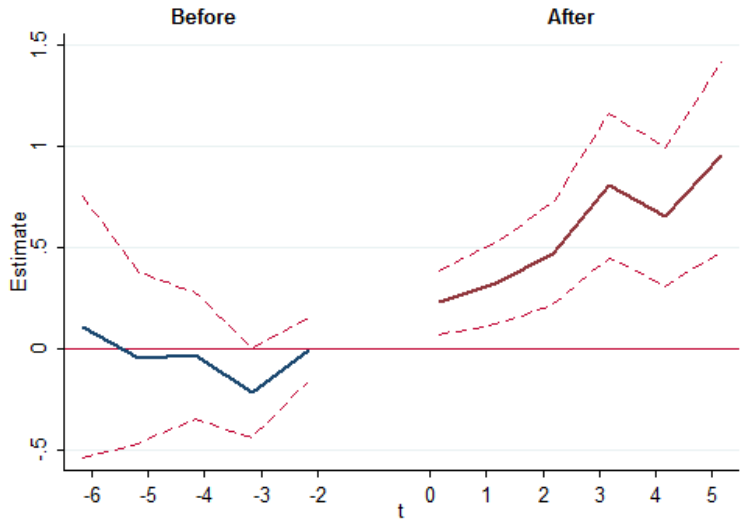
Note: Regression includes firm fixed effects and year fixed effects. The omitted group is firms with unsuccessful expansions at time $t = -1$.

market.[7] Figure 2.1 shows that export revenue is increasing as firms are getting ready to expand beyond their original export destination. This finding is reassuring as I feared firms might be doing poorly in the original export market and expand in an attempt to keep exporting. The figure shows this is not the case. After an expansion, however, export revenue decreases substantially for several periods.

There are numerous explanations why firms unable to expand beyond their original market may see a drop in export revenue after the expansion failure. A difference-in-difference framework may be more appropriate than a pre- and post-exporting analysis if, for example, firms tend to expand at peak exports and a decreases in exports after the peak may be expected. Event study Figure 2.2

[7]Figures with product as the basis for the original market are found in the Appendix (see Appendix Figures 2.A.1 and 2.A.2).

Figure 2.2: Ln(Export Revenue): Successful vs. Unsuccessful Expansions in Destinations



Note: Regression includes firm fixed effects and year fixed effects. The omitted group is firms with unsuccessful expansions at time $t = -1$.

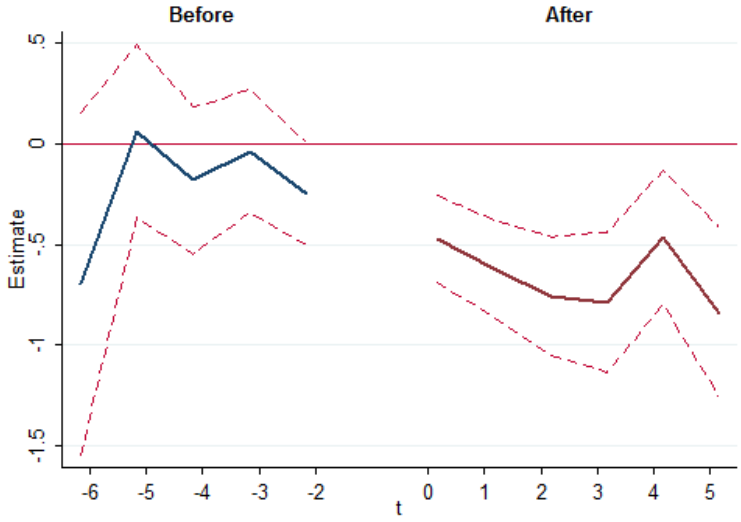
shows that there are no statistically significant differences after controlling for firm fixed effects between successful and unsuccessful expanding firms in the before-expanding period; this implies that both firm types had similar trends before their expansions. The difference between the two is substantial in the after-expanding period and the difference increases over time.

The second stylized fact is that export expansions beyond the original market is associated with a sharp drop in export revenue growth in the original market.[8] Figure 2.3 shows that export revenue growth is not statistically significantly different than their growth trend as firms are getting ready to expand beyond the original export destination.[9] Nonetheless, I find a strong association between per-

[8]Similar figures with the product bundle as the original market are in the Appendix (see Appendix Figures 2.A.3 and 2.A.4).

[9]The figure does not show that firms are not growing in the before-exporting period. Since the regression that generated this figure has firm fixed effects the estimates excludes any firm

Figure 2.3: ΔLn(Export Revenue): Unsuccessful Expansion in Destination



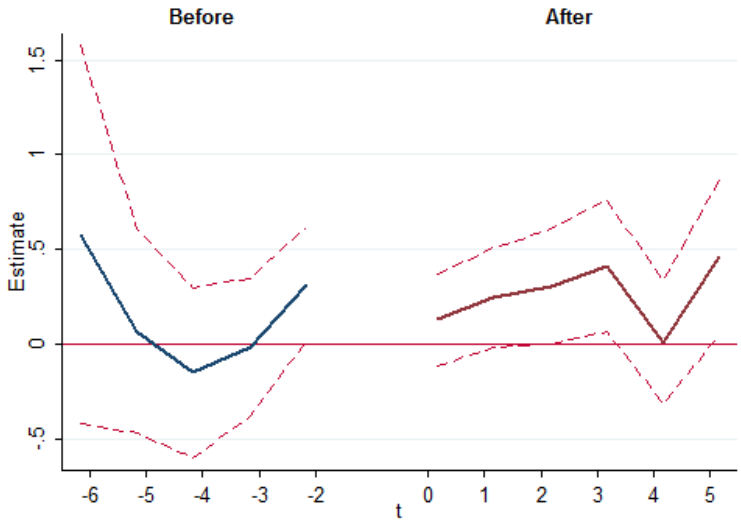
Note: Regression includes firm fixed effects and year fixed effects. The omitted group is firms with unsuccessful expansions at time $t = -1$.

formance and attempting to expand. After the expansion, export revenue growth decreases substantially for several periods.

I compare the difference in original market export revenue growth between firms that successfully expand and those that do not in Figure 2.4. Just as in the case of export revenue, there is no statistically significant difference in the before-exporting period between firms that succeed at expanding and those that do not. However, when comparing these firms in the after-exporting period, we see firms that successfully expand do much better; some of the differences are not statistically significant. Part of the reason I may not find a statistically significant difference is that I do not separate financially constrained firms. The effect of expansion failure should be stronger on those firms. Additionally, if some firms that successfully expand may also be financially constrained. Such a constraint

specific, linear growth trend.

Figure 2.4: ΔLn(Export Revenue): Successful vs. Unsuccessful Expansions in Destinations



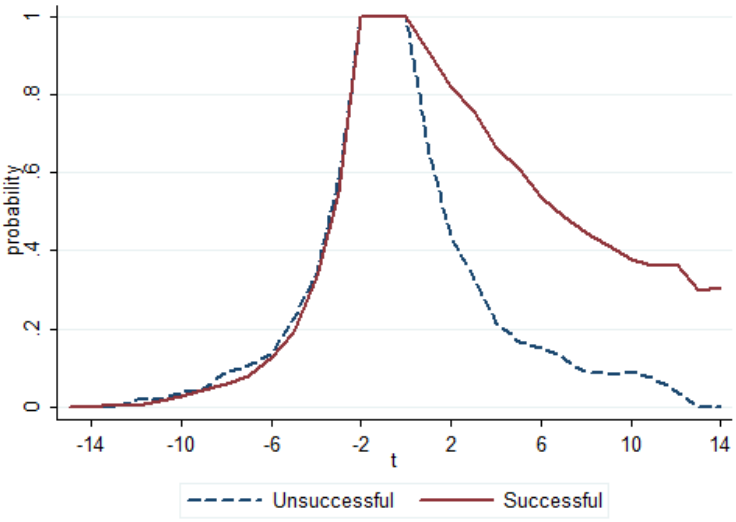
Note: Regression includes firm fixed effects and year fixed effects. The omitted group is firms with unsuccessful expansions at time $t = -1$.

may limit revenue growth in the original market for firms that successfully expand. Nevertheless, a drop in export revenue growth for firms that successfully expand is not as worrisome as these firms supplement for the loss of export revenue in the original market with revenue from other export markets. While I do not find any statistically significant difference in the event study analysis, I do find it in the traditional difference-in-difference study—with a pre- and a post-period comparison—in the empirical section to follow.

The third stylized fact is that exiting the original export market is more likely for firms that unsuccessfully expand than it is for those that successfully do so. Figure 2.5 shows the share of firms in the sample by expansion success in the export destination and expansion period; it is an average of all expansion cohorts.[10] In

[10]I get a very similar figure if I look at expansions beyond the original product bundle, see Appendix Figure 2.A.5.

Figure 2.5: Firm Entry and Exit: All Expansion in Destination Cohorts Average



Note: The figure shows the average share of firms in the data by cohort and firm type at time t. By design, the number of firms in the data do not change at $t = -2, -1, 0$.

the figure, by design, all firms are in the sample two periods before expanding ($t = -1, -2$) and the year the firm first expands ($t = 0$). In the pre-exporting period ($t < 0$), the figure shows the time from start of exporting in the original market to start of expansion. In these periods, there is no significant difference between firms that successfully expand and those that do not. Interestingly, the figure shows that there is a relatively short period between when a firm enters its original market and when it expands; in the data, a bit over half of the sample was exporting three years prior to the expansion. This collaborates the sequential exporting idea.

The outcomes for the two types of firms are very different in the after expanding period ($t > 0$); in those periods, the figure shows the time from start of expansion into a new market to end of exporting in the original export market. In these periods, firms that attempt to expand and fail are more likely to exit the export

market and do so in quite a dramatic manner. Three years after the expansion attempt only about 33 % of the firms with failed expansions remain in the sample and about 75 % of firms that successfully expanded remain in the sample. The difference in survival rates is increasing over time.

III Empirical Evidence: Expansion Failure and Its Consequences

In Section II, I find that expansion failure is associated with poor performance in the original export market; export revenue, export revenue growth, and the probability of continuing to supply that original market all decrease after a firm attempts to expand and fails. The findings are mostly robust to comparisons with firms that succeeded in their expansion attempt. However, the stylized facts are not enough to identify expansion failure as the cause of poor market performance, poor market performance as the cause of expansion failure, or a third factor as the cause of both outcomes. In this section, I employ a baseline empirical equation based on the theoretical model found in Mora (2015). I also eliminate as many alternative explanations as possible for the identified association.

III.1 Baseline empirical specification

In trying to identify whether expansion failure leads to poor performance in the original export market, I must be conscious of the alternative explanations for some of these coincidences. First, certain firm characteristics (productivity of a firm, export product, export destination, etc.) may make a firm more likely to

succeed in expanding to new markets and to also do better in the original export market after the expansion attempt. Second, the association may be due to the timing of the expansion; for example, expanding right before the Great Recession likely resulted in expansion failure. Other similar concerns include price changes, demand changes, or overall economic environment affecting all firms in a given year. Third, the association may merely show the life cycle of exports. If that is the case, then firms should grow in their original export market before expanding, the firm then tries to enter new markets as export sales peak in the original market, and finally growth slows or decreases in the original market after the expansion attempt. This can happen whether or not the firm succeeded in the expansion. Similarly, maybe firms expand after receiving a positive shock in their original market. So firms may seem to be doing better before expanding and then revert to their average after the expansion. Finally, a firm may also experience an idiosyncratic productivity shock that coincides with the export expansion. This shock may result in expansion failure and in poor export performance in the original market.

Because of the above mentioned concerns, all of the regressions control for several key variables. First, the estimates only make use of within-firm variation by always including firm fixed effects. These effects control for any time-invariant firm characteristics, such as those mentioned above. Second, all regressions include calendar year dummies to control for economic conditions affecting all firms in a given year. Finally, to account for firm trend concerns, all the regressions include comparison between the treatment and control groups. The primary control group is firms that successfully expand beyond their original market, but an alternative control group (non-expanding firms) is included in subsections below.

The identification here does not eliminate the possibility that firms experience idiosyncratic productivity shock that correlate with an expansion attempt.

The baseline empirical equation is the following:

$$Y_{it} = \alpha_i + \delta_t + \beta_1 After_{it} + \beta_2 After_{it} \cdot Successful_i + u_{it} \tag{2.1}$$

In Equation (2.1), the firm is indexed by i and calendar year by t. The outcome variable, Y_{it}, measures economic performance in one of the the original export markets; as mentioned above, the measurements of the original export market used are initial destinations reached and the initial product bundle. The outcome variables used in this section are the same as those used in the previous section: 1) the log of nominal export sales in US dollars; 2) the change in log export revenue; and 3) firm exits from the original market. The firm fixed effects are represented by α_i and the calendar year fixed effects by δ_t. $After_{it}$ captures common trends between successful and unsuccessful expanding firms in the ex-post period (it equals one for all calendar years after a firm first expands, and zero otherwise). $Successful_i$ captures characteristics specific to firms that expand successfully. $Successful_i$ does not vary by firm and equals one for firms that export to new markets for multiple years, and zero otherwise. This dummy is absorbed by the firm fixed effects when they are included. The variable is only included in the results using $Exit_i$ as the outcome variable; these estimates do not make use of the panel data and do not have firm fixed effects. $After_{it} \cdot Successful_i$ is the difference-in-difference estimator; it measure the difference in the after-expanding period between firms that successfully expand and those that do not. Thus, β_2 is the estimate of interest. Lastly, u_{it} is the error term.

A theoretical model similar to that in Mora (2015) for export expansion would predict that both successful and unsuccessful expanding firms that are financially constrained decrease sales in the original export market after expanding, $\beta_1 < 0$, but the decrease should be less for successful expanding firms, $\beta_2 > 0$. As I did in that paper, here I also separate out the short-run ($After(t = 0)_{it}$), medium-run ($After(t = 1\ to\ 5)_{it}$), and long-run ($After(rest)_{it}$) effects. Thus, I extend Equation (2.1) and split the $After_{it}$ dummy into three periods:

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

Based on the same theoretical model, I expect all of these estimates to be negative. β_{11} may corresponds to capacity constraints affecting both successful and unsuccessful expanding firms. β_{12} and β_{13} are more interesting because in those periods firms with failed expansions supply only their original market. I also change the interaction term ($\beta_2 After_{it} \cdot Succ_i$); this term becomes:

$$\beta_{21} After(t = 0)_{it} \cdot Succ_i + \beta_{22} After(t = 1\ to\ 5)_{it} \cdot Succ_i + \beta_{23} After(rest)_{it} \cdot Succ_i$$

These estimates measure the short-run, medium-run, and long-run differences-in-difference between successful and unsuccessful expanding firms. The empirics focus on these difference-in-difference estimates.

III.2 Baseline estimates

Baseline estimates with first destination as the original market

To test the predictions, I estimate modified Equation (2.1) with export revenue in the firms destinations reached (the original export market) as the outcome variable. This export revenue increases by 11% after a destination expansion (see Model 1 of Table 2.3). The estimate, however, includes both firms that succeed and firms that fail in their expansion attempt. Once I separate firms that successful expand to new markets from the estimate (Model 2), we see that export revenue actually decreases for firms that fail in an expanding attempt (-18%) and we see that the firms that succeed do much better (the difference-in-difference estimator is 39%). If I split the after-expanding period into three periods (Model 3), we see that the drop in revenue increases over time (no statistically significant drop in the short run, a drop of about 40% in the medium run, and a drop of about 80% in the long run), and so does the difference between firms that successfully expand and those that did not (the difference-in-difference estimator is 26% in the short run, 49% in the medium run, and 75% in the long run).[11]

As an alternative measurement of original export market performance I use domestic revenue growth as the outcome variable. In the same table, we see that while export revenue increases (Model 1), export revenue growth decreases by 44% (Model 4). It decreases even for firms with successful expansions (Model 5); these firms do better (11%) than firm with unsuccessful expansions, but the difference

[11]I address missing values in the Appendix. Appendix Tables 2.A.2, 2.A.3, and 2.A.4 deal with zeros by 1) adding one to zero values before taking logs, 2) using a Poisson regression, and 3) running a levels regression, respectively. The results become stronger in the first, but weaker in significance in the last two. This lack of significance in these estimates is due to outliers.

Table 2.3: Baseline Regressions with First Destination as the Original Market

	log(Export Revenue)			Δ log(Export Revenue)		
	(1)	(2)	(3)	(4)	(5)	(6)
After	0.11**	-0.18**		-0.44***	-0.53***	
	(0.05)	(0.07)		(0.04)	(0.08)	
Year of export			-0.07			-0.44***
			(0.08)			(0.10)
After($t = 1 - 5$)			-0.39***			-0.67***
			(0.09)			(0.10)
After(rest)			-0.81**			-0.42*
			(0.34)			(0.25)
Successful*After		0.39***			0.11	
		(0.08)			(0.09)	
Successful*(year of exp)			0.26***			0.06
			(0.08)			(0.11)
Successful*After($t = 1 - 5$)			0.49***			0.19*
			(0.09)			(0.10)
Successful*After(rest)			0.75**			-0.07
			(0.34)			(0.24)
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	12,782	12,782	12,782	9,809	9,809	9,809
Number of clusters/groups	1,847	1,847	1,847.00	1,814	1,814	1,814
Adjusted R^2	0.026	0.030	0.031	0.049	0.050	0.050

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis.

is not statistically significant. Separating the ex post period into three periods (Model 6), we find that while revenue growth decreases for all firms, firms that successfully expand do better in the medium run (19%). The effects here may be hidden because I cannot separate out the financially constrained firms. Either way, as mentioned earlier, a drop in export revenue growth in the original export market is less worrisome for firms that successfully expand since these firms make up for the loss with revenue from other export markets.

Baseline estimates with first product as the original market

I replicate the steps taken above but define the original export market as the first export product bundle. I find very similar results. I again estimate modified Equation (2.1) with export revenue in this other "original export market" as the outcome variable. Export revenue increases by 21% after an expansion in the product bundle (see Model 1 of Table 2.4). Once I separate firms that successfully expand from the estimates (Model 2), we see that export revenue decreases for firms that fail in their expansion attempt (-12%) and increases for those firms that succeed (the difference-in-difference estimator is 46%). If I separate the after-expanding period into the three ex post periods, we see that the drop increases over time (-12% in the short run, -36% in the medium run, and -53% in the long run), and so does the difference between successful and unsuccessful expanding firms (the difference-in-difference estimator is 45% in the short run and 55% in the long run); the difference-in-difference estimator, however, is not statistically significant in the long-run.[12]

While the result are similar for the log export revenue regression using the two measurements of the original market, they are different for the export revenue growth regressions. Export revenue growth in the original market decreases, as before, for all firms after an expansion (Models 4 to 6). However, we see that the decrease is much less for firms that successfully expand (Model 5), the differences-in-difference estimator is large (28%) and statistically significant. Separating the after-exporting period into the three periods, we see the difference is only statistically significant in the short run (31%) and medium run (38%). As I mentioned

[12]I address missing values in the Appendix. Appendix Tables 2.A.2, 2.A.3, and 2.A.4 deal with zeros by 1) adding one to zero values before taking logs, 2) using a Poisson regression, and 3) running a levels regression, respectively.

before, the drop is more worrisome for firms that fail at expanding since this export market is their only export market.

Table 2.4: Baseline Regressions with First Product as the Original Market

	log(Export Revenue)			Δ log(Export Revenue)		
	(1)	(2)	(3)	(4)	(5)	(6)
After	0.21***	-0.12*		-0.25***	-0.46***	
	(0.04)	(0.07)		(0.04)	(0.07)	
Year of export			-0.12*			-0.32***
			(0.07)			(0.09)
After($t = 1 - 5$)			-0.36***			-0.73***
			(0.10)			(0.09)
After(rest)			-0.53**			-0.42**
			(0.26)			(0.22)
Successful*After		0.46***			0.28***	
		(0.08)			(0.08)	
Successful*(year of exp)			0.45***			0.31***
			(0.08)			(0.11)
Successful*After($t = 1 - 5$)			0.55***			0.38***
			(0.10)			(0.09)
Successful*After(rest)			0.41			0.08
			(0.25)			(0.20)
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	12,870	12,870	12,870	10,120	10,120	10,120
Number of clusters/groups	1,809	1,809	1,809	1,779	1,779	1,779
Adjusted R^2	0.058	0.063	0.065	0.041	0.042	0.048

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis.

III.3 Propensity score matching

What is the appropriate control group for exporters that attempt to enter new markets and fail? I have been using successful expanding firms as the control group because both of these firm types made the decision to expand beyond their original market. However, the results can be endogenous and there may be some unobserved differences that explain the observed association. To address this

concern, I add another another control group using propensity score matching (PSM): exporters that do not expand beyond their original market. This group did not invest in an expansion, but may have made other investments (for example, research and development) to improve their products and export sales in their existing export markets. These firms might make a better control group for firms that attempt to expand and fail.

In order to match firms that fail at expanding (unsuccessful expander) with those that did not expand (non-expanders) and those that successfully expanded (successful expanders), I use nearest-neighbor propensity score matching. I use PSM for non-expanders to assign these firms an artificial after-expanding period. I assign this period based on the unsuccessful expander match; that is, each non-expander is assigned a pseudo expanding cohort based on that of the unsuccessful expander to which it matched. I can then track non-expanders before and after the hypothetical expanding year and compare the market performance of non-expanders with that of unsuccessful expanders. I follow a similar procedure to match successful expanders with unsuccessful ones. The difference is that successful expanders already have an exporting cohort.

The variables used to calculate the propensity score are 1) log export revenue in the original market before an expansion, 2) number of products exported the first year of exporting, 3) number of destinations reached the first year of exporting, 4) number of products times number of destinations, 5) the frequency (number of months) exported the first year, and 6) the share of exports going to developed countries the first year.[13] I include (1) to ensure that I compare similar sized

[13]I classify a destination as "developed" if the exports were destined for the European Union 27, Switzerland, Taiwan, Hong Kong, Singapore, South Korea, Japan, Israel, Australia, New Zealand, Canada, or the United States.

firms. I include (2), (3), and (4) because multi-products and multi-destination firms play such a significant role in exporting (see Bernard, Jensen, Redding, and Schott 2007). I include (5) because exporting multiple times a year may explain export success; firms exporting multiple times a year may make more contacts and may export have an easier time finding export matches. Finally, I include (6) to ensure that I compare firm exporting to similar destinations; firms exporting to developed countries may be more ambitious or more likely to compete with developed country firms.

To get a propensity score for each firm, I regress the variables mentioned above on the probability of being an unsuccessful expander. Since the before-exporting period length differs by firm, I have more export data for some firms than I do for others. To take advantage of this, I create an algorithm to match firms using as much of the data as possible. Thus, unsuccessful expanders were matched with firms having at least as much export data in the ex ante period. I perform one-to-one matching without replacement based on the propensity score and impose a common support to find the match.[14] I force the match to be within the same start-up sector (chapter-level ISIC). I calculate the match twice: once to get unsuccessful expanders to match with non-expanders and the other to match unsuccessful expanders with successful expanders. Thus, based on the data, the only observable difference in the match with unsuccessful expanders is either in the decision to expand (in the case of non-expanders) or in their expansion success (in the case of successful expanders). Since I have multiple definitions of the original market and this results in different firms being classified as unsuccessful expanders, I do matching procedure above twice: one for destination as the original export

[14]Since the ordering of the data might affect a firm's match, I randomize the data before matching.

market and one for the product as the original export market.

Propensity score matching estimates

Having constructed alternative "control" groups using PSM, I then repeat the baseline estimation procedure. I estimate modified Equation (2.1) including non-expanding firms. Table 2.5 shows the propensity score matching estimates with the initial export destination as the original export market. Export revenue appears unchanged after an expansion (Model 1). But once I separate the firm types (Model 2), unsuccessful expanders decrease export revenue by 25% after an expansion attempt, while successful expanders do 34% better and non-expanders do 26% better. In Model 3, the first difference increases over time for unsuccessful expanders (no statistically significant difference in the short run, -47% in the medium run, and -94% in the long run) and the difference-in-difference increases as well for both control groups; the difference-in-difference estimator for successful expanders is 19% in the short run, 43% in the medium run, and 74% in the long run, and the difference-in-difference estimator for non-expanders is not statistically significant in the short run, 39% in the medium run, and 72% in the long run.

The export revenue growth first difference estimates (Models 4–6) are similar to the baseline estimates: export revenue growth decreases in all models. The difference-in-difference estimates between successful expanders and unsuccessful expanders are 22% overall (Model 5), but the estimates in the short and long run are not statistically significant (Model 5). The difference-in-difference estimates between non-expanders and unsuccessful expanders are mostly positive, but not

Table 2.5: Matched Regressions with First Destination as the Original Market

	log(Export Revenue)			Δ log(Export Revenue)		
	(1)	(2)	(3)	(4)	(5)	(6)
After	-0.07	-0.25***		-0.45***	-0.56***	
	(0.06)	(0.08)		(0.06)	(0.08)	
Year of export			-0.12			-0.45***
			(0.08)			(0.10)
After($t = 1 - 5$)			-0.48***			-0.57***
			(0.10)			(0.11)
After(rest)			-0.94***			-0.13
			(0.36)			(0.27)
Succ.*After		0.34***			0.22**	
		(0.10)			(0.10)	
Succ.*(year of exp)			0.19*			0.04
			(0.10)			(0.14)
Succ.*After($t = 1 - 5$)			0.43***			0.33***
			(0.12)			(0.12)
Succ.*After(rest)			0.74**			0.12
			(0.37)			(0.26)
Dom.*After		0.26**			0.08	
		(0.13)			(0.14)	
Dom.*(year of exp)			0.05			0.07
			(0.13)			(0.18)
Dom.*After($t = 1 - 5$)			0.39**			0.16
			(0.16)			(0.16)
Dom.*After(rest)			0.72*			-0.69**
			(0.39)			(0.31)
Firm and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,340	7,340	7,340	5,881	5,881	5,881
Clusters/groups	1,179	1,179	1,179	1,179	1,179	1,179
Adjusted R^2	0.018	0.021	0.024	0.056	0.056	0.060

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis. The variables used to calculate the propensity score are 1) log export revenue in the original market before an expansion, 2) number of products exported the first year of exporting, 3) number of destinations reached the first year of exporting, 4) number of products times number of destinations, 5) the frequency (number of months) exported the first year, and 6) the share of exports going to developed countries the first year.

statistically significant.

I replicate the same steps but take the initial export product bundle as the original market. Table 2.6 shows the propensity score matching estimates for initial export products as the original export market. The estimates are similar to the previous estimates (Table 2.5), but I find important differences. Export revenue in this original export market appears to now increase (16%), not remain unchanged, after an expansion (Model 1). But once we separate out the firm type (Model 2), unsuccessful expanders decrease export revenue by 15% after expanding, while the control groups do much better: successful expanders do 64% better and non-expanders do 23% better; the estimates are not statistically significant for non-expanders. In Model 3, the pre/post difference increases over time and the difference-in-difference estimates increase for successful expanders; and the estimates in the medium run are now positive and statistically significant for non-expanders.

When looking at revenue growth as the outcome variable in this original export market (Models 4–6) we get similar results. The main difference from this an the previous results is that the difference-in-difference estimator between unsuccessful expander and non-expanders are now statistically significant overall (Model 5) and in the medium run (Model 6). Since the size of the estimates is also larger, this may imply that the effect of expansion failure is greater when expanding to new products than when expanding to new destinations.

Table 2.6: Baseline Regressions with First Product as the Original Market

	log(Export Revenue)			Δ log(Export Revenue)		
	(1)	(2)	(3)	(4)	(5)	(6)
After	0.16***	-0.15**		-0.28***	-0.47***	
	(0.06)	(0.07)		(0.06)	(0.08)	
Year of export			-0.07			-0.35***
			(0.08)			(0.10)
After($t = 1 - 5$)			-0.39***			-0.70***
			(0.10)			(0.10)
After(rest)			-0.42			-0.25
			(0.28)			(0.24)
Succ.*After		0.64***			0.36***	
		(0.10)			(0.10)	
Succ.*(year of exp)			0.60***			0.43***
			(0.10)			(0.13)
Succ.*After($t = 1 - 5$)			0.74***			0.42***
			(0.12)			(0.11)
Succ.*After(rest)			0.58**			0.11
			(0.28)			(0.21)
Dom.*After		0.23			0.23*	
		(0.14)			(0.14)	
Dom.*(year of exp)			0.06			0.20
			(0.14)			(0.17)
Dom.*After($t = 1 - 5$)			0.35**			0.33**
			(0.17)			(0.16)
Dom.*After(rest)			0.37			-0.63**
			(0.34)			(0.30)
Firm and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,790	7,790	7,790	6,147	6,147	6,147
Clusters/groups	1,302	1,302	1,302	1,297	1,297	1,297
Adjusted R^2	0.044	0.055	0.057	0.046	0.048	0.056

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis. The variables used to calculate the propensity score are 1) log export revenue in the original market before an expansion, 2) number of products exported the first year of exporting, 3) number of destinations reached the first year of exporting, 4) number of products times number of destinations, 5) the frequency (number of months) exported the first year, and 6) the share of exports going to developed countries the first year.

III.4 Exit estimates

Another measurement of original export market performance is the probability of exiting that market. These results underscore how large the negative effects of expansion failure may be. Table 2.7 estimates are for the two original markets (initial destination and initial product bundle) and include the baseline and matched Exit estimates; all estimates control for year of first exporting, the year of expansion, and sector (ISIC chapter level). There is no before-exporting period since for these results I do not make use of the panel aspect of the data. Exiting has two meaning depending: 1) for unsuccessful expanders and matched non-expanders, exiting means that the firm exits the export market altogether, and 2) for successful expanders, exiting means that the firm exits the original export market, but not that it stops exporting.

The baseline estimates for initial destination (Models 1 and 2) and for initial product (Models 5 and 6) are very similar. Unsuccessful expanders are more likely than successul expanders to stop exporting; about 20% more when I define the original market as the initial destination and about 30% when I define the original market as the initial product bundle. Since the effect of a failed expansion are greater when defining the original export market based on the export product bundle, this results also imply that the risk of an expansion is greater when expanding to new products than when expanding to new destinations. The result hold even after controlling for 1) log initial export revenue in the original export market, 2) initial number of products exported, 3) initial number of destinations reached, 4) initial number of products times number of destinations, 5) initial frequency (number of months) exported and 5) initial share of exports going to developed countries. These variables are for the most part not statistically significant.

Table 2.7: Exit Results for Baseline and Matched Regressions, by Original Market

Original Market ⇒	First Destination				First Product			
	Baseline		Matched		Baseline		Matched	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Successful	-0.21***	-0.21***	-0.25***	-0.25***	-0.30***	-0.30***	-0.32***	-0.33***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)
Domestic			0.07***	0.07**			0.01	0.01
			(0.03)	(0.03)			(0.02)	(0.02)
Initial ln(export)		-0.01		-0.01		-0.01		-0.01
		(0.01)		(0.01)		(0.01)		(0.01)
Initial Num. of Destinations		0.00		0.01		-0.02***		-0.03***
		(0.01)		(0.01)		(0.01)		(0.01)
Initial Num. of Products		0.00		-0.00		0.00		-0.00
		(0.00)		(0.00)		(0.00)		(0.00)
Initial Num. of Destinations*products		0.00		0.00		0.00		0.00**
		(0.00)		(0.00)		(0.00)		(0.00)
Initial Frequency Exp. (months)		-0.02***		-0.02**		-0.00		0.00
		(0.01)		(0.01)		(0.01)		(0.01)
Initial Share Developed		-0.07***		-0.03		0.03		0.04
		(0.03)		(0.03)		(0.03)		(0.03)
Number of observations	1,847	1,847	1,179	1,179	1,809	1,809	1,302	1,302
Adjusted R^2	0.152	0.166	0.230	0.237	0.195	0.203	0.292	0.300

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parenthesis. The regressions also control for industry (ISIC chapter level), export cohort, and expansion cohort. The variables used to calculate the propensity score are 1) log export revenue in the original market before an expansion, 2) number of products exported the first year of exporting, 3) number of destinations reached the first year of exporting, 4) number of products times number of destinations, 5) the frequency (number of months) exported the first year, and 6) the share of exports going to developed countries the first year.

The matched estimates in Table 2.7 for initial destination (Models 3 and 4) and for initial product bundle (Models 7 and 8) are similar when I compare successful with unsuccessful expanders. This is consistent with the finding using export revenue and export revenue growth as a measurement of original export market performance. However, The difference between unsuccessful expanders and non-expanders depend on the original export market definition; unsuccessful expander are less likely than non-expanders to stop exporting (about 7%) when I define the original market as the initial destination and are not statistically significantly different from each other when I define the original market as the initial product bundle. The finding holds after controlling for the observables. Thus, the estimates using non-expanders as a control give conflicting results depending on the measurement of original market performance. Above we saw that non-expanders do better in terms of export revenue and export revenue growth, but here they do worse in terms of the probability of going out of the export business.

IV Conclusion

This paper shows that expansions beyond the original export market are rare and many are unsuccessful. Additionally, expansion failure is associated with negative outcomes in the original export market. Specifically, export revenue, export revenue growth, and the probability of exporting all decrease after a firm attempts to enter a new market and fails. The finding are robust to comparisons with firms that successfully expand. Firms with unsuccessful expansions also do worse than those that do not expand in terms of export revenue and export revenue growth in the original market. Comparing these firms in terms of the probability of con-

tinuing to export, yield contradictory results; Firms with unsuccessful expansions do better when the original export market is defined as the initial export destinations reached, but there is not statistically significant difference between the two firms types when the original export market is defined as the initial export product bundle.

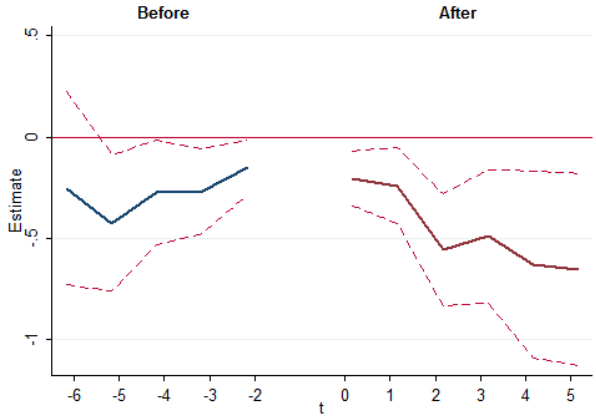
The finding, for the most part, corroborate my previous finding on export failure. This chapter has the benefit of being able to observe product bundle, not just destination, expansions. But the work here also has some drawbacks; the main drawback is the lack of domestic data, such as investments, debt, assets, etc. The lack of these data prevented a comparison between firms that are, and firms that are not, financially constrained; the export failure chapter found that the effects of a failed export investment were larger for financially constrained firms. Additionally, the domestic variable would have resulted in better firm matches. The firm matches in this chapter only make use of export data and might not be as good; this may explain the contradictory results mentioned above.

Finally, because of the lack of data, I am unable to differentiate between two mechanism behind the results. Do firms do worse after an expansion attempt because of financial constraints or because of expansion failure signaling to investors to lower investment in a particular firm? The distinction is important. I need to identify the correct mechanism before trying to identify the policy implications of my findings. Nonetheless, the finding are important as they identify important firm dynamics and corroborate my previous work on export failure.

A Appendix

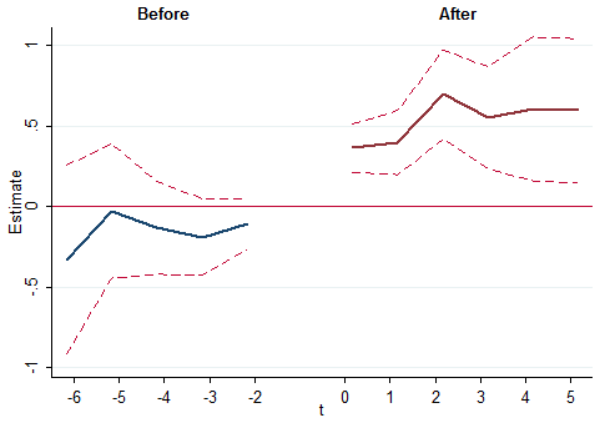
A.1 Appendix Figures

Figure 2.A.1: Ln(Export Revenue): Unsuccessful Expansion in Product Bundle



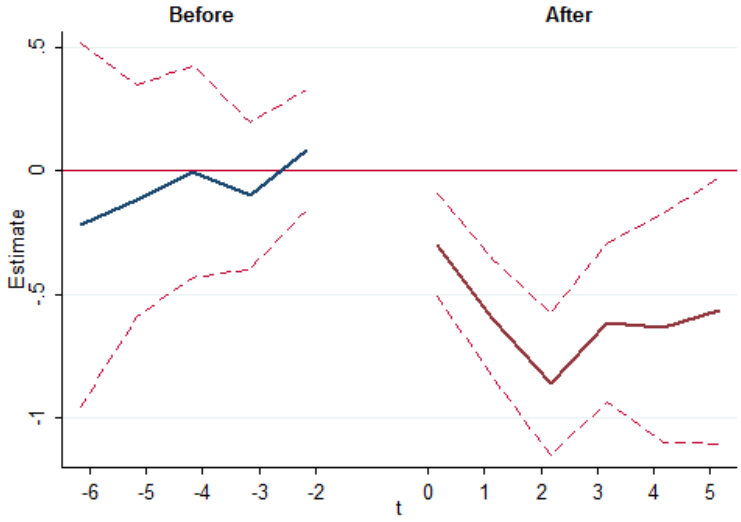
Note: Regression includes firm fixed effects and year fixed effects. The omitted group is firms with unsuccessful expansions at time $t = -1$.

Figure 2.A.2: Ln(Export Revenue): Successful vs. Unsuccessful Expansions in Product Bundle



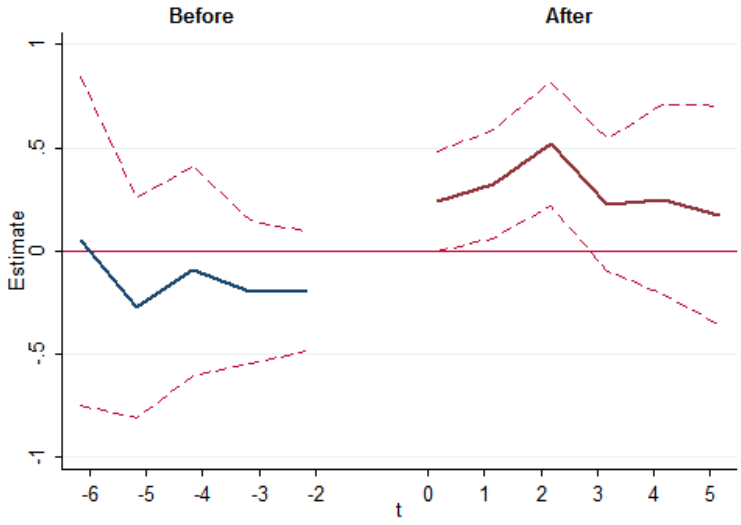
Note: Regression includes firm fixed effects and year fixed effects. The omitted group is firms with unsuccessful expansions at time $t = -1$.

Figure 2.A.3: ΔLn(Export Revenue): Unsuccessful Expansion in Product Bundle



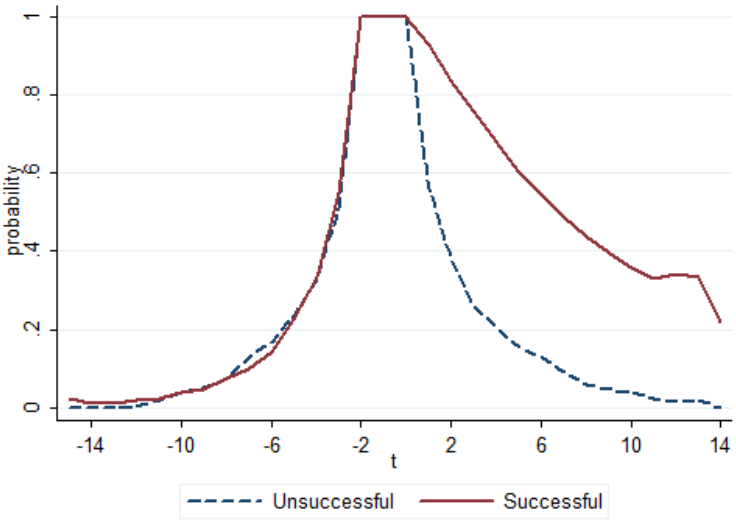
Note: Regression includes firm fixed effects and year fixed effects. The omitted group is firms with unsuccessful expansions at time $t = -1$.

Figure 2.A.4: ΔLn(Export Revenue): Successful vs. Unsuccessful Expansions in Product Bundle



Note: Regression includes firm fixed effects and year fixed effects. The omitted group is firms with unsuccessful expansions at time $t = -1$.

Figure 2.A.5: Firm Entry and Exit: All Expansion in Product Bundle Cohorts Average



Note: The Figure shows the average share of firms in the data by cohort and firm type at time t. By design, the number of firms in the data do not change at $t = -2, -1, 0$.

A.2 Appendix Tables

Table 2.A.1: Alternative Definitions: A Cross-Section Approach

Firm Type	Total	Average	Share	Share cont.
Onetime expander	10,052	670.1	8.1	17.2
Successful expander	9,338	622.5	7.5	15.9
Non-expanders	39,199	2,613.2	31.7	66.9
Ender	15,142	1,009.4	12.2	
Onetime exporter	33,738	2,108.6	25.5	
Starter	19,722	1,232.6	14.9	
Total	127,191	82,56	100	100

Note: "Non-expanders" are firms that did not expand at t the number of export destinations; "Onetime expander" are firms that expanded at t, but not at $t+1$; "Successful expander" are firms that expanded at t and $t+1$; "Ender" are firms that do not exports at $t+1$; "Starter" are firms that do not exports at $t-1$; and "Onetime exporter" are firms that do not exports at $t-1$ or $t+1$.

Table 2.A.2: Baseline Regressions with Dependent Variable = log(Export Revenue +1), by Original Market

	Destination			Product		
	(1)	(2)	(3)	(1)	(2)	(3)
After	-0.30**	-2.07***		-0.13	-2.39***	
	(0.12)	(0.20)		(0.11)	(0.20)	
Year of export			1.28***			1.19***
			(0.10)			(0.10)
After($t = 1 - 5$)			-4.14***			-4.78***
			(0.24)			(0.23)
After(rest)			-4.39***			-5.05***
			(0.27)			(0.27)
Successful*After		2.42***			3.22***	
		(0.20)			(0.21)	
Successful*(year of exp)			-0.06			0.23**
			(0.11)			(0.11)
Successful*After($t = 1 - 5$)			3.12***			4.14***
			(0.24)			(0.24)
Successful*After(rest)			2.46***			3.11***
			(0.25)			(0.26)
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	19,534	19,534	19,534	19,523	19,523	19,523
Number of clusters/groups	1,847	1,847	1,847	1,809	1,809	1,809
Adjusted R^2	0.330	0.341	0.376	0.300	0.321	0.368

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis.

Table 2.A.3: Baseline Regressions with Dependent Variable = PPML(Export Revenue), by Original Market

	Destination			Product		
	(1)	(2)	(3)	(1)	(2)	(3)
After	0.67***	0.43**		-0.59***	-0.89***	
	(0.12)	(0.17)		(0.22)	(0.30)	
Year of export			0.24**			0.16
			(0.11)			(0.16)
After($t = 1 - 5$)			0.30			-0.39
			(0.18)			(0.28)
After(rest)			0.62			-1.55***
			(0.47)			(0.34)
Successful*After		0.32			0.39	
		(0.23)			(0.44)	
Successful*(year of exp)			0.35**			-0.49**
			(0.15)			(0.23)
Successful*After($t = 1 - 5$)			0.46**			-0.08
			(0.23)			(0.33)
Successful*After(rest)			-0.12			1.59***
			(0.50)			(0.38)
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	19,534	19,534	19,534	19,523	19,523	19,523
Number of groups	1,847	1,847	1,847	1,809	1,809	1,809
Cluster by Firm	No	No	No	No	No	No

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis.

Table 2.A.4: Baseline Regressions with Dependent Variable = Export Revenue (Thousand USD), by Original Market

	Destination			Product		
	(1)	(2)	(3)	(1)	(2)	(3)
After	428.23***	322.39*		-2,336.97	-3,352.74	
	(144.95)	(181.41)		(1,906.92)	(2,279.83)	
Year of export			207.44*			-1,608.53
			(122.59)			(1,425.08)
After($t = 1 - 5$)			312.88			-3,764.04
			(206.84)			(2,773.60)
After(rest)			425.28			-7,873.56
			(380.28)			(5,237.08)
Successful*After		144.67			1,448.43*	
		(212.43)			(809.99)	
Successful*(year of exp)			162.81			-204.53
			(172.22)			(266.63)
Successful*After($t = 1 - 5$)			201.20			596.78
			(214.84)			(529.82)
Successful*After(rest)			-6.23			4,767.49*
			(315.53)			(2,516.54)
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	19,534	19,534	19,534	19,523	19,523	19,523
Number of clusters/groups	1,847	1,847	1,847	1,809	1,809	1,809
Adjusted R^2	0.002	0.002	0.002	0.003	0.003	0.004

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors, clustered at the firm level, shown in parenthesis.

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