Financial constraints and trade intermediation

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Abstract

There are two ways that a firm can export: directly or indirectly via a trade intermediary. This paper examines the relationship between financial frictions and how firms decide between these modes of export. Financial frictions arise because firms rely on external finance for their working capital needs but can only borrow up to a multiple of their assets. I calibrate the model using a dataset on Vietnamese firms from 2005 to 2015. In addition to the productivity sorting pattern into exporting, the model shows that financial frictions distort firm's behaviors. I find that indirect exporting serves as a substitute for access to external financing. As financial frictions increase, the share of firms electing to be indirect exporters increases as well. A 25% subsidy for indirect exporting further reduces the average assets that a firm must save by 3.61% in the first year with smaller but persistent effects after that.

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1 Introduction

Trade intermediaries such as wholesalers, retailers and trading companies play an important role in facilitating international trade. Ahn, Khandelwal, and Wei (2011) estimate that about 20% of Chinese exports are carried by these intermediaries. In Turkey and the U.S., about 17% and 10% of total exports are carried indirectly respectively (Abel-Koch, 2013; Bernard, Jensen, Redding, & Schott, 2010). The role of trade intermediaries is particularly important in countries with poor financial development as finance can be a major barrier to international trade for firms due to the large upfront costs associated with exporting (Manova, 2012; Chaney, 2016; Engemann, Eck, & Schnitzer, 2014). If a firm is not able to export directly due to the large upfront costs, exporting indirectly through a trade intermediary can be a viable alternative to participate in trade. In this paper, I investigate how a firm's financial constraints affect their export decisions and the role of indirect exporting in alleviating such constraints.

Using a firm-level dataset on Vietnamese firms from 2005 to 2015, I document that firms are financially constrained and rely heavily on external finance for their working capital needs. I classify firms in the sample into three types based on their reported sales: non-exporters, indirect and direct exporters. The data suggest that non-exporters and direct exporters have high persistence in their status: most of them maintain the same status between periods. On the other hand, indirect exporting seems less persistent and acts more as a temporary platform. Compared to domestic producers, firms with indirect exporting experience have twice the likelihood of becoming a direct exporter in the next period.

To explain these observations from the data, I extend the standard dynamic Melitz (2003) model and include financial frictions in the form of a borrowing limit. In order to finance their working capital and the fixed costs of operating, firms have to borrow money but can only borrow up to a multiple of their assets due to financial frictions. Under a borrowing constraint, there is a minimum asset threshold along with the productivity cutoff into exporting (directly/indirectly). Financing constraints also imply that some firms will not be able to operate at their optimal level as they would in the frictionless economy because they do not have enough assets. Some firms with limited assets do not find it profitable to export directly but they may still have enough assets to export indirectly. Without indirect exporting, these low asset firms would only serve the *Home*

market.

The existence of a financial constraint implies that firms must accumulate assets to overcome the borrowing limit. This allows the model to explain the observation from the data that indirect exporters are more likely to become direct exporters than their domestic peers. The additional income from indirect exporting helps a firm finance their transition into direct exporting. The option to export indirectly allows them to earn higher profits and to accumulate more assets than they would as a non-exporter. This relaxes the borrowing constraint and raises the firm's likelihood of transitioning into direct exporting in the future. As a result, a firm is likely to start small and have few assets, so they are less likely to be a direct exporter. But as they grow and accumulate more wealth from their retained earnings, they are able to expand production and eventually become direct exporters. Similar to the data, indirect exporting in the model is transitory and acts as a stepping stone to transition into direct exporting.

The calibrated model shows that as the degree of financial frictions increases, the role of indirect exporting becomes more important. More firms become indirect exporters and consequently, a larger share of the total industry exports is carried indirectly. From the calibrated model, I conduct three policy experiments: a trade liberalization, an indirect export subsidy that encourages indirect exporting and a financial reform. In the first year, the increase in total sales due to a trade liberalization is approximately 30% lower in the constrained industry compared to an unconstrained industry. But after 10 years, this gap decreases: a trade liberalization increases sales by 23.75% in the constrained industry compared to a 24.63% increase in the unconstrained industry. The change is more gradual in the constrained industry due to the existence of financial frictions. I find that indirect exporting can be a substitute for access to finance. A 25% subsidy for indirect exporting reduces the amount of assets that a firm must save by 3.61% in the first year. Lastly, I examine the effect of a potential reform that brings the level of financial development of Vietnam to that of the U.S. The total sales and exports increase by 1.97% and 2.89% respectively after 10 years following the reform.

The paper is organized as follows. Section 2 briefly outlines the related literature. Section 3 is an overview of the dataset and some motivating evidence. Section 4 presents the theoretical framework. Sections 5 and 6 present the model calibration and results. Section 7 conducts three policy experiments from the model. Section 8 concludes.

2 Related Literature

This paper contributes to the growing literature on a firm's export decision and access to financing. On the empirical side, Manova (2012) and Chaney (2016) incorporate credit constraint into the static Melitz (2003) model and find that access to credit is an important determinant of a firm's export decision. Using a survey of Italian firms, Minetti and Zhu (2011) show that credit constrained firms have a lower chance of becoming exporters. They also find that a lack of access to credit lowers both domestic and foreign sales. Besedeš, Kim, and Lugovskyy (2014) show that the role of financial constraints diminishes as export duration increases.

Other quantitative studies such as Caggese and Cuñat (2013) and Brooks and Dovis (2020) analyze the aggregate impact of financial constraints and find that financial frictions lower the aggregate gains from trade. In particular, Caggese and Cuñat (2013) find that financial frictions reduce the aggregate productivity gains from trade liberalization by 25%. In Brooks and Dovis (2020), financial frictions act as barriers to trade, but the gains from trade liberalization depends on the structure of the borrowing constraint. Kohn, Leibovici, and Szkup (2016) study how a borrowing constraint impacts the new exporter dynamics and show that financial frictions are an important barrier to trade. Financial constraint in my paper is modelled similar to the symmetric case in Kohn et al. (2016) and the backward-looking case in Brooks and Dovis (2020). My paper contributes to this quantitative literature but adds the dimension of indirect exporting as a channel for firms to overcome existing financial frictions.

This paper also contributes to the literature on trade intermediation. Ahn et al. (2011) extend the Melitz (2003) framework in a static model to incorporate the intermediary sector and allow firms to choose their modes of export: directly or indirectly through an intermediary at a lower fixed cost. When traded through an intermediary, despite paying a lowest cost, firms are charged a per-unit cost as a service fee. Therefore, to access the foreign market, firms face a trade off between high fixed cost and low variable costs for direct exports versus lower fixed cost but higher variable costs if they trade through an intermediary. The model predicts that the most productive firm exports directly, smaller and less productive firms export indirectly. Grazzi and Tomasi (2016) also find similar sorting patterns among exporters. Abel-Koch (2013) use the World Bank Enterprise dataset for Turkey to find that the share of indirect exporters declines with firm size: as firms

grow, indirect exporting becomes less attractive. My work is closely related to Bai, Krishna, and Ma (2017), who develop a dynamic model with trade intermediaries and learning by exporting to show that direct exporters are able to learn about how to produce faster than indirect exporters. In contrast to their work, I focus on the effects of financial frictions on firms' choice of export modes.

3 Data

This project focuses on Vietnamese firms, utilizing The World Bank Enterprise Dataset. Bai et al. (2017) study Chinese firms' behaviors when Chinese firms could only export if they could obtain a trading license. Unlike China, Vietnam did not impose restrictions on exporting. Firms are not required to have a license to trade and are allowed to trade freely by law. Any firm with a business license is allowed to be an intermediary. Many Vietnamese firms exist solely as trade intermediaries, advertising themselves as service providers for those that wish to import or export but do not have the means or the expertise.[1] This could be because they do not have experience in trading or because they wish to participate in the world market without having to pay the high cost associated with direct trading.

In this section, I document a set of facts from the data on a firm's export decision and their financial status. These facts provide motivations for the theoretical model.

3.1 Data overview

The survey used in this paper is the World Bank Enterprise (WBE) Dataset, conducted on a set of registered firms [2] in Vietnam in 2005, 2009 and 2015, containing information on firms' finance, sales, employment, borrowing and business environment. Firms are asked about general characteristics of their operations such as financial vulnerability, barriers to enter exporting, employment (skilled and unskilled, temporary and full-time), types of ownership, capital utilization, collateral value etc. Firms are identified by a unique code in all years of the sample. I keep only firms that appear in all years of the survey. While the survey includes firms in both manufacturing and the services sectors, only manufacturing firms are included.

[1] These firms usually have both Export and Import or Trading in their registered names.
[2] The sample for Vietnam was selected using stratified random sampling.

Table 1: Summary of firms (WBE Survey)

	Non-exporters	Indirect Exporters	Direct exporters	Total exporters
2005	56.90%	8.62%	34.48%	43.10%
2009	50.00%	10.34%	39.66%	50.00%
2015	51.72%	9.48%	38.79%	48.27%
Average	52.87%	9.48%	37.64%	47.13%

Note: Non-exporters report 100% of their annual sales as domestic sales. Indirect exporters report positive shares of annual sales in indirect exporting but none in direct exporting. The remaining firms are direct exporters. Note that some direct exporters report sales through both indirect and direct exporting. Total exporters refers to the sum of indirect and direct exporters.

The common practice in the trade intermediary literature is to infer export mode from firms' names (Ahn et al., 2011) or to match balance sheets data with export transactions data (Bai et al., 2017). These imputations could be prone to systematic errors and thus bias inferences about trade growth and intermediation. In contrast, the World Bank Survey directly identifies firms' export modes as they are asked about the shares of their sales that are from domestic, indirect or direct exporting. Specifically, the survey asks firms the percentage of their annual sales that were from: (1) national sales, (2) indirect exports (sold domestically to a third party that exports products) and (3) direct exports. I divide firms in the sample into three groups based on their responses. I characterize a firm as a non-exporter if they report 100% of their sales as domestic sales. Firms are labeled as indirect exporters if they report positive percentage of sales in indirect exporting but zero in direct export sales. In the data, some firms report positive shares of annual sales for both indirect and direct exporting. I classify those firms as direct exporters. Table 1 provides a summary of these three firm types in the WBE data. The shares of each type of firms remain steady over the years observed in the data. The share of firms as indirect exporters is small but not insignificant, about 9% each year.[3]

Table 2 documents firm-size differences across three groups of firms: non-exporters, indirect and direct exporters. On average, direct exporters are the biggest firms and employ the most

[3]Bai et al. (2017) and Abel-Koch (2013) find similar statistics: between 7 and 9% of firms in China and Turkey are indirect exporters each year.

Table 2: Export status and firm size

	Export status			
Firm size	Non-exporters	Indirect exporters	Direct exporters	All exporters
Average number of workers	116.66	212.60	720.65	570.65
Small	77.06	9.18	13.77	22.94
Medium	53.50	12.61	33.89	46.50
Large	26.32	7.02	66.67	73.69

Note: Firms are sorted into size bins based on the number of workers that they report. Each entry in the table reports the shares of the size bin that belongs to each export status.

workers [4], followed by indirect exporters and non-exporters. The average number of workers employed by direct exporters is about 3.40 and 6.18 times the average employment by indirect exporters and non-exporters respectively. Based on the number of workers, I divide firms into three size bins: small, medium and large. Among small firms in the bottom third of the distribution, most of them are non-exporters (77.06%). The share of non-exporters among the large firms is significantly smaller (only 26.32%). The reverse is true for exporters (including direct and indirect exporters). While the share of exporters among small firms is only 22.94%, this number increases to 73.68% among large firms. As firms become larger, direct exporting is more prevalent. This observation follows the empirical evidence in international trade that exporters tend to be larger and more productive since they have to be big enough to cover the fixed and sunk costs of exporting (Abel-Koch, 2013; Bernard & Jensen, 2007).

3.2 Transition probability of export modes

Next, I compare the dynamic exporting behavior of the three groups. Table 3 shows the transition probability across export modes among all firms in the sample. Firms that have had exposure to exporting through intermediaries in the previous period are more than twice as likely to switch to direct exporting than firms without the experience (probability of 0.2771 versus 0.1371). This table shows that there exists some persistence in export mode choice: firms tend to stay in the same

[4] Permanent and temporary workers.

exporting category between t and $t+1$. Direct exporters are likely to remain in direct exporting with a probability of 0.7907. The persistence of non-exporting is similar at 0.7823. The persistence in indirect exporting is lower (probability of 0.4091). This suggests that indirect exporting is possibly a transitory platform to facilitate access to foreign markets.

Table 3: Transition probability of export modes

Export status in period t	Export status in period $t+1$		
	Home	Indirect exporting	Direct exporting
Home	0.7823	0.0806	0.1371
Indirect Exporting	0.3182	0.4091	0.2727
Direct Exporting	0.1628	0.0465	0.7907

Note: Each row shows the probability of a firm's switching from each exporting status between t and $t+1$ (WBE data). Home producers are firms that have 100% of annual sales as domestic sales. Indirect exporters report positive values in indirect exporting but none in direct exporting. Firms that report positive sales in direct exporting are classified as direct exporters.

3.3 Financial constraint

This project is also motivated by how financial constraints may affect firm decisions in international trade. Table 4 provides an overview of firms' financial needs using the World Bank Enterprise Survey. I took the average across all years in the sample. Firms in the survey are asked how difficult it is to access finance (collateral requirements, costs, availability of loans etc). Answers include: no obstacle, minor obstacle, moderate obstacle, major obstacle and very severe obstacle. I identify firms as having major financial constraint if their answer is either "major obstacle" or "very severe obstacle". Around a fifth of firms in the survey (21.47%) consider finance as a major constraint in their operations. The second row in the table shows how firms finance their working capital. On average, they rely heavily on external finance for their working capital needs. About 50% of a firm's working capital is financed by external sources. This includes loans from banks, non-bank institutions and other informal financial sources (friends, relatives etc).

As expected, direct exporters require the most financing from external sources (58.12%), followed by indirect exporters and non-exporters. There is about a 10 percentage point difference

Table 4: Financing needs among firms (WBE Survey)

	All	Non-exporters	Indirect exporters	Direct exporters
Shares of firms as constrained	21.47%	23.64%	23.79%	17.06%
Fraction of working capital financed externally	49.66%	47.88%	51.30%	58.12%

Note: Firms are classified as "constrained" if they answer "major obstacle" or "very severe obstacle". External finance includes loans from banks, non-bank institutions and other informal sources (friends, relatives, customers etc.) other than a firm's retained earnings.

between non-exporters and direct exporters in their working capital needs. Exporting either as an indirect or a direct exporter is costly because of the high requirement for working capital. Note that direct exporters use more external finance for their working capital needs but are less likely to identify access to finance as a "major constraint". This reflects the fact that exporters tend to be bigger and more productive, hence, they require more financing for their production needs. At the same time, as these firms tend to be bigger, they may be perceived as more reputable and less risky. Therefore, they are more likely to secure more loans from banks and other financial institutions.

4 Model

To explain observations documented in section 3, I develop an extension of the standard Melitz (2003) model to include financial frictions and intermediated trade in a partial equilibrium setting. Financial frictions arise in the form of a borrowing limit for working capital.

4.1 Model overview

Since the paper focuses on firm's export decisions, all firms in my model always serve the Home market. Additionally, I do not consider firm entry and exit. Each firm enters the period with a firm-specific productivity z and assets a. Given these state variables, firms choose their export modes: non-exporting, indirect exporting or direct exporting. The problem of the firm can be split into two problems:

1. The static problem: firm chooses their optimal prices and export modes to maximize their

profits in the Home and the Foreign markets subject to a borrowing constraint. Without sunk cost, the firm's export mode decision is a part of the static problem.

2. The dynamic problem: The firm chooses the dividend distribution and assets for the next period.

4.2 Setup

Individuals in a country supply labor inelastically. Preferences have a constant elasticity of substitution between varieties $\sigma > 1$:

$$U = \left(\int_{\Omega_t} q_t(\omega)^{\sigma/(\sigma-1)} d\omega \right)^{\sigma/(\sigma-1)}, \quad \sigma > 1 \tag{1}$$

where Ω_t is the set of varieties available, $q_t(\omega)$ is the demand for variety $\omega \in \Omega_t$.

4.3 Static problem

Each firm hires only labor as input and produces according to the production function: $y_i = z_i L_i$. For a firm i that exports, their production function can be written as the sum of production for the Home market and production for exporting:

$$y_i = y_H + y_F = z_i L^H + z_i L^{\{I,D\}} = z_i L_i$$

where L^H is labor for Home production, $L^{\{I,D\}}$ is the labor input for export production and depends on the firm's choice of export mode. Each firm faces the following demand schedules:

$$q_H = \left(\frac{p_H^{-\sigma}}{P_H^{1-\sigma}} \right) Q_H \qquad q_X = \left(\frac{p_F^{-\sigma}}{P_F^{1-\sigma}} \right) Q_F$$

where σ is the elasticity of substitution, (Q_H, Q_F, P_H, P_F) are aggregate quantities and price indices for the industry; q_H is the quantity sold in the Home market, and q_X is the quantity sold in the foreign market where $X \in \{I, D\}$ depends on the firm's export mode decisions. Note that a direct exporter and an indirect exporter face a similar demand schedule. However, their pricing decisions will differ due to the the specific variable trade costs associated with each exporting technology.

In each period, a firm has to pay in advance their product costs, which include the total wage bill and any fixed costs if they choose to export. However, each firm faces a borrowing constraint

and can only borrow up to a multiple of their current assets.[5]

The domestic firm solves the following profit maximization problem by choosing the optimal price p_H subject to the demand schedule in the Home market and the borrowing constraint for the total wage bill:

$$\pi_H = \max_{p_H} \; p_H q_H - wL^H \tag{2a}$$

$$s.t.\; q_H = \left(\frac{p_H^{-\sigma}}{P_H^{1-\sigma}}\right) Q_H \tag{2b}$$

$$L^H = \frac{q_H}{z} \tag{2c}$$

$$wL^H \leq \lambda a \tag{2d}$$

In the Foreign market, a firm that chooses to be an indirect exporter pays a fixed cost F_I that can be interpreted as a search cost for a trade intermediary in each period. Additionally, they have a to pay a per unit variable cost $\tau^I > 1$ that represents an intermediary commission fee. Their profit maximization problem is:

$$\pi_I = \max_{p_I} \; p_I q_I - wL^I - \frac{w}{z}\tau^I q^I - wF_I \tag{3a}$$

$$s.t.\; q_I = \left(\frac{{p_F}^{-\sigma}}{P_F^{1-\sigma}}\right) Q_F \tag{3b}$$

$$wL^I + wF_I \leq \lambda a \tag{3c}$$

$$L^I = \frac{\tau^I q_I}{z} \tag{3d}$$

Similarly, a direct exporter chooses the optimal price to maximize their period profits subject to the demand schedule and the borrowing constraint:

$$\pi_D = \max_{p_D} \; p_D q_D - wL^D - \frac{w}{z}\tau^D q^D - wF_D \tag{4a}$$

$$s.t.\; q_D = \left(\frac{{p_F}^{-\sigma}}{P_F^{1-\sigma}}\right) Q_F \tag{4b}$$

$$wL^D + wF_D \leq \lambda a \tag{4c}$$

$$L^D = \frac{\tau^D q_D}{z} \tag{4d}$$

[5]This setup is similar to the case of symmetric working capital needs in Kohn et al. (2016)

where F_D is the per period fixed costs, $\tau_d > 1$ is the unit variable cost.

In order to sort firms into different bins of export modes, the model requires a trade-off between the costs to export for direct and indirect exporting. The fixed cost for direct exporting F^D is higher than the fixed cost for indirect exporting F^I. On the other hand, an indirect exporter incurs a higher variable cost τ^I than a direct exporter.[6] Intuitively, a direct exporter has to pay a higher cost each period to set up their own stores abroad but does not have to pay a commission fee besides the shipping cost for each unit. Therefore, they face a higher fixed cost F^D and a lower variable cost τ^D.

In each period, a firm makes the export decision of whether to export and the mode of export (direct versus indirect exporting). The export mode decision (X_t) can be written as:

$$X_t = \begin{cases} \text{Indirect, if } \pi^I = \max\{\pi^H, \pi^I, \pi^D\} \text{ and } \pi^I \geq 0 \\ \text{Direct, if } \pi^D = \max\{\pi^H, \pi^I, \pi^D\} \text{ and } \pi^D \geq 0 \\ \text{Home, otherwise} \end{cases}$$

where $X_t \in \{I, D\}$ is the export mode choice.

4.4 Dynamic problem

A firm's productivity is modelled as an AR(1) process with persistence ρ:

$$\ln(z_t) = \rho \ln(z_{t-1}) + \varepsilon_t, \qquad \varepsilon \sim N(0, \sigma_z^2) \tag{5}$$

Given firm specific state variables (z, a), other aggregate state variables for prices and quantity demanded (P_H, Q_H, P_F, Q_F), a firm chooses the dividend distribution d and asset saving a' for the next period to solve:

$$V(z, a; X) = \max_{d, a'} \{d + \beta E_z V(z', a'; X')\} \tag{6}$$

$$s.t. \qquad d + a' = (1 + r)a + \pi^X(a, z) \tag{7}$$

where $X \in \{I, D, H\}$ is the export status decision of the firm. The per period profit $\pi^x(a, z)$ is characterized in the static problem given their export status choice. If a firm decides to only

[6] If the fixed cost of direct exporting is lower $F^D < F^I$, then the variable cost τ^D must be higher than τ^I. Otherwise, one option is always cheaper and no firms select into that mode of export.

operate in the Home market and not to export ($X = H$), they earn a profit $\pi(a, z) = \pi^H$. If a firm is an indirect exporter ($X = I$), their profit is the sum of the profits at Home and Foreign markets: $\pi = \pi^H + \pi^I$. Similarly, a direct exporter's profit is $\pi = \pi^H + \pi^D$. These cases are summarized in the following manner:

$$\pi^X(a, z) = \begin{cases} \pi^H, \text{ if } X_t = H \\ \pi^H + \pi^I, \text{ if } X_t = I \\ \pi^H + \pi^D, \text{ if } X_t = D \end{cases}$$

5 Calibration

In this section, I discuss the model estimation and the model's fit to the data. The model is calibrated to match key firm-level moments related to export participation and external finance dependence as documented in section 3. Parameters in the model are split into two groups: one set consists of parameters' values taken from the literature, another set is estimated within the model using Simulated Method of Moments (SMM). I show that the model is able to match broadly the features in the data.

5.1 Externally calibrated parameters

Table 5: Parameters determined outside of the model

Parameters		Value	Source
Discount factor	β	0.967	Average annual real interest rates 2005-2015
Elasticity of substitution	σ	5	Brooks and Dovis (2019)

Note: Pre-determined parameters are taken from the data or the literature.

Table 5 lists the parameters and their values that are taken from the literature or the data. I set the discount factor β equal to 0.967 to match the annual real interest rates in Vietnam between 2005

and 2015.[7] This value is within the range of common values in the literature.

The elasticity of substitution σ cannot be estimated from the dataset. I follow (Brooks & Dovis, 2019) and set this parameter equal to 5. [8]

5.2 Internally calibrated parameters

The remaining parameters in the model are: $\{F_D, F_I, \lambda, \tau^I, \tau^D, \sigma_z, \rho\}$. They are jointly estimated to match moments from the data that describe the export participation, the size difference, export intensity and the external finance dependence. Specifically, these moments are: (1) the share of firms that are direct exporters, (2) the share of firms that are indirect exporters, (3) the median size difference (labor usage) between direct exporters and *Home* firms, (4) the median size difference between direct and indirect exporters, (5) the average export intensity of direct exporters, (6) the average export intensity of indirect exporters and (7) the average external finance ratio. All of these moments from the data are calculated using the WBE dataset. For comparison, I also calibrate a version of the model without financial frictions ($\lambda = \infty$). In this version, I only have 6 parameters to estimate $\{F_D, F_I, \tau^I, \tau^D, \sigma_z, \rho\}$ and I match the first six moments.

To find the parameters of interest, I use the Simulated Method of Moments (SMM) and search over the parameter space to minimize the following objective function:

$$L(\phi) = \min_{\phi}(M_{model} - M_{data})' W (M_{model} - M_{data})$$

where $\phi = \{F_D, F_I, \lambda, \tau^I, \tau^D, \sigma_z, \rho\}$ is the vector of model parameters to be estimated, M_{model} is the vector of moments computed from the simulated data in the model and M_{data} is the vector of moments computed from the data. The weighting matrix W is the inverse of the variance-covariance matrix of the data moments.[9] I simulate a panel of 2000 firms for 1000 periods. I then drop the initial periods and save only the last 11 periods (the same as the data) to calculate the moments the same way as I have done in the WBE dataset.

The per period fixed costs of direct and indirect exporting (F_D, F_I) affect the firm's decision whether to export and which export mode. Therefore, these parameters affect the shares of direct

[7] I use the World Bank Data on real interest rates in Vietnam to calculate this value

[8] See Ruhl and Willis (2017), Melitz and Redding (2015), and Broda and Weinstein (2006)

[9] The moments are calculated by bootstrapping the sample 1000 times. Each bootstrapped sample is drawn with replacement.

Table 6: Calibrated parameters

Calibrated parameters		Model (a)	Model (b)
Fixed cost of direct exporting	F_D	6.55	6.92
Fixed cost of indirect exporting	F_I	4.56	4.56
Variable cost of indirect exporting	τ^I	1.21	1.24
Variable cost of direct exporting	τ^D	1.12	1.13
Persistence productivity process	ρ	0.93	0.85
Std. productivity process	σ_z	0.05	0.07
Borrowing parameter	λ	3.45	—

(a): Calibration for economy with financial frictions.
(b): Calibration for economy without financial frictions.

and indirect exporters in the sample.

The parameters for the productivity process govern the distribution of productivity in the model. This allows me to match the size difference in the calibration.

The iceberg trade cost for direct exporting τ^D and the intermediary cost for indirect exporting τ^I affect the export values relative to total sales since they reflect how costly exporting production is relative to Home production.

Firms that export also have higher financing needs due to the per period fixed costs. In the model, in order to produce, these exporting firms seek external finance conditional on their assets. Therefore, the borrowing parameter λ also affects the size difference between exporters and Home producers. This parameter also affects the external finance ratio since it reflects the access to finance for a firm. [10]

Table 6 reports the estimates for the internally calibrated parameters. The calibration in both models (a) and (b) yields higher fixed costs for direct exporting compared to the fixed costs for indirect exporting. On average, fixed costs are about 10% and 8% of indirect and direct exporters'

[10]External finance ratio is calculated in the data as the percentage of working capital that is financed not by a firm's internal retained earnings. In the model, this corresponds to the additional payment for working capital and fixed costs of exporting besides the firm's existing assets.

Table 7: Moments in the data and in the model

Moments	Data	Model	
		(a)	(b)
Share of direct exporters	0.38	0.39	0.35
Share of indirect exporters	0.09	0.11	0.08
Export intensity (direct exporters)	0.63	0.61	0.60
Export intensity (indirect exporters)	0.56	0.53	0.52
Median size difference(D/H)	5.31	5.67	5.40
Median size difference(D/I)	3.53	1.78	1.71
External finance ratio	0.50	0.50	—

Note: Data moments are calculated using the WBE dataset.
(a): Calibration for financial friction model.
(b): Calibration for frictionless model.

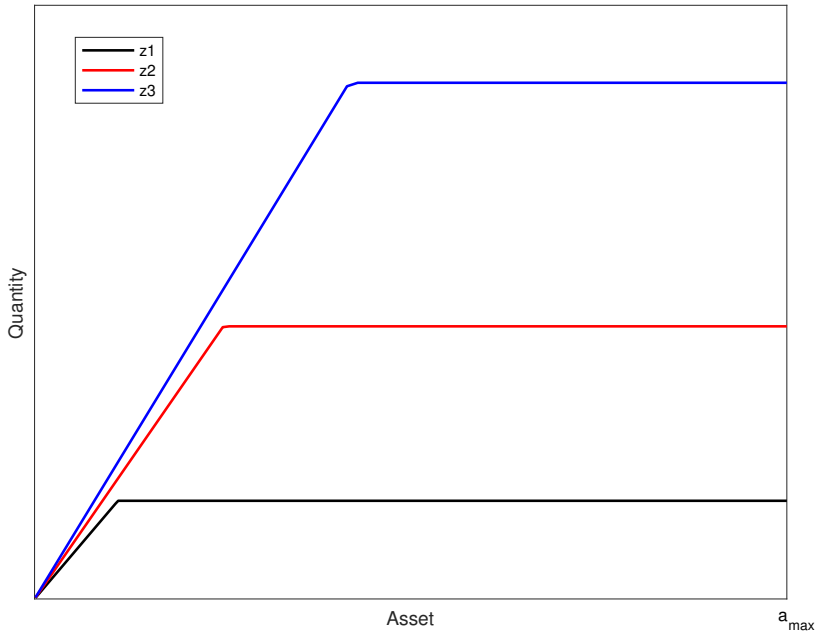
revenues. On the other hand, the variable cost of direct exporting is lower than indirect exporting. This reflects the trade-off between paying lower fixed costs but higher variable costs for indirect exporting as discussed in the theoretical results.

5.3 Model fit

Table 7 reports the model performance in matching the key empirical moments. The model broadly matches the data.[11] In both models (a) and (b), the moments for size differences between direct and indirect exporters in the sample are underestimated. The models require a smaller fixed cost of direct exporting in order to match the share of firms as direct exporters. In the model, some of the indirect exporters would have chosen to be *constrained* direct exporters without indirect exporting. As a result, they are on average larger and closer in size to direct exporters than in the data.

[11] While the external finance ratio is not targeted in the calibration for the frictionless model, this moment is about 0.98 in the model.

Figure 1: Home production, keeping productivity fixed at $z_1 < z_2 < z_3$



6 Results

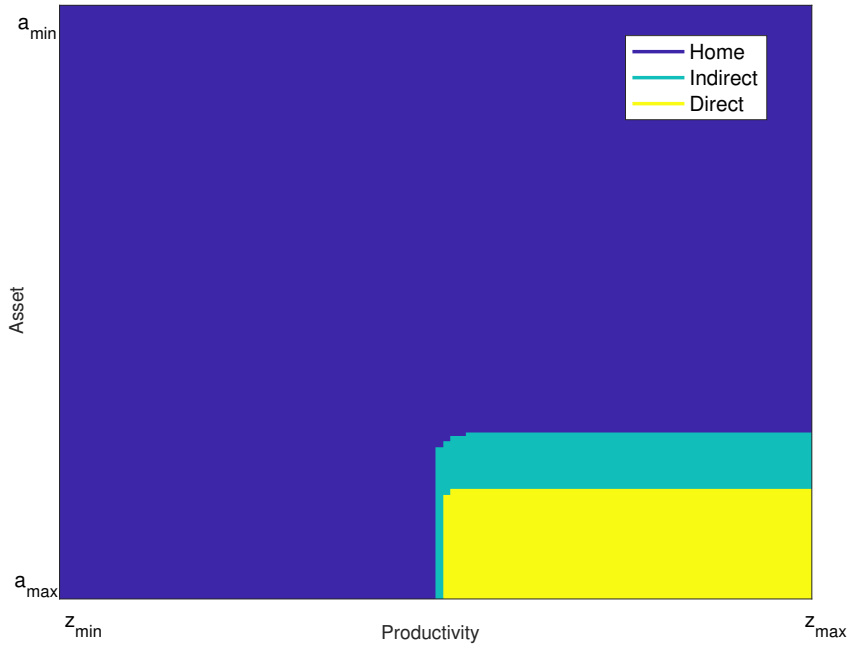
Having parameterized the model, I now analyze the mechanism in the model and evaluate how well the model can account for the dynamic behavior of firms documented in section 3. I show that financial frictions affect both the firms' production and export decisions.

The calibrated model shows that indirect exporting is particularly important when the degree of financial frictions increase. The existence of indirect exporting provides firms with an additional channel to accumulate assets so that they can grow and eventually become direct exporters. Therefore, indirect exporting serves as a substitute for access to external finance and reduces the severity of financial frictions.

6.1 The effects of financial frictions

In a perfect credit economy ($\lambda = \infty$), firms are unconstrained and assets have no role in their production decisions. The unconstrained production for Home $q^{H,U}$ is the optimal level and is higher than what a constrained firm can produce. Therefore, in the presence of financial frictions,

Figure 2: Export decisions

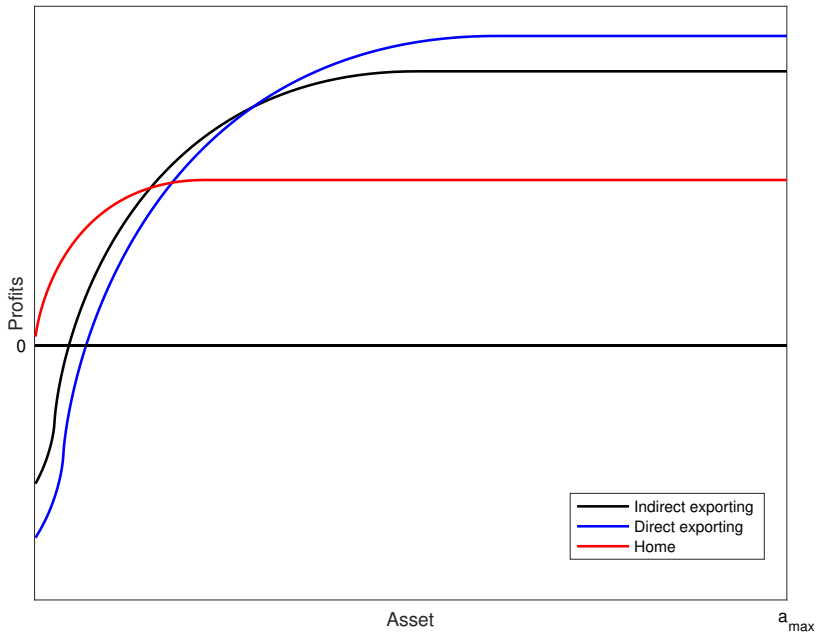


some firms are constrained to producing below the optimal level. The effect of financial frictions on production is illustrated in Figure 1 which shows the quantity of *Home* production against assets, fixing productivity at three levels $z_1 < z_2 < z_3$. The kink on each line shows the minimum asset required to achieve the optimal unconstrained production associated with each productivity. The more productive a firm is, the more assets they need to hold in order to reach the unconstrained level of output.

In the absence of financial frictions, all firms have unlimited access to finance and operate at the optimal scale. As a result, a firm's assets have no effect on their export profits, only productivity determines the sorting pattern into exporting. However, under financial frictions, the cutoff for exporting depends on both a firm's productivity and assets. Figure 2 plots the regions for different export decisions to demonstrate the cutoffs for different modes of exporting. Firms with low productivity z and low asset a do not export and always serve at Home. If their productivity z is high enough, the firm's export decision depends on the firm's asset a. The higher a firm's productivity is, the lower the asset threshold for exporting. Figure 2 shows that direct exporters are firms that are most productive and have the highest assets.

The asset threshold for a given productivity z is shown in figure 3, which plots the profit function for different levels of assets, fixing productivity z. If z is high enough, at low assets, the export profit for either mode of export is below the zero profit line. Therefore, the firm is not able to export and chooses to only serve the Home market. At higher assets, a firm can enter exporting and chooses indirect exporting since it is the more profitable option. As assets increase, direct exporting yields higher profits and is a more desirable option. Additionally, for a given z, there is an asset threshold $\bar{a}$ such that if $a > \bar{a}$, assets have no effect on the firm's production decision. These firms export directly, produce at the unconstrained optimal level for exports and earn the unconstrained profits.

Figure 3: Asset cutoff for a given productivity z



For indirect exporters with low assets, they gradually accumulate assets more quickly than non-exporting firms because of the additional profit from exporting. Without the option of indirect exporting, these firms with low assets can only serve in the Home market. With indirect exporting, they can earn higher profit and accumulate more assets than firms that only serve at Home. Therefore, these firms are more likely to be in the high asset region in the next period and are more likely to transition into direct exporting. Thus, the presence of a borrowing constraint affects

the firm's decision to export. This is consistent with the empirical results in the credit constraint literature.[12]

Table 8 reports the aggregate implications of different values for the borrowing parameter λ. The two extreme values of $\lambda = 1$ and $\lambda = \infty$ respectively reflect an economy where firms cannot borrow (financial autarky) and an economy where firms have unlimited access to finance. All other calibrated parameters remain the same so that the only source of difference comes from the different values of λ.

Smaller values of λ results in more firms being financially constrained.[13] When $\lambda = \infty$, firms have unlimited access to finance and therefore, all firms are unconstrained and produce at their optimal level according to their productivity. However, when λ decreases to the financial autarky level, almost 50% of firms are financially constrained.

Table 8: Aggregate implications of financial frictions

	Borrowing parameter λ					
	∞	2.5	2	1.5	1.25	1
Fraction of firms constrained (%)	0	20.53	23.63	31.04	38.89	49.58
Fraction of firms as indirect exporters (%)	9.43	11.08	11.46	12.68	12.83	15.52
Exports carried indirectly(%)	10.32	13.16	14.30	16.64	17.93	25.73

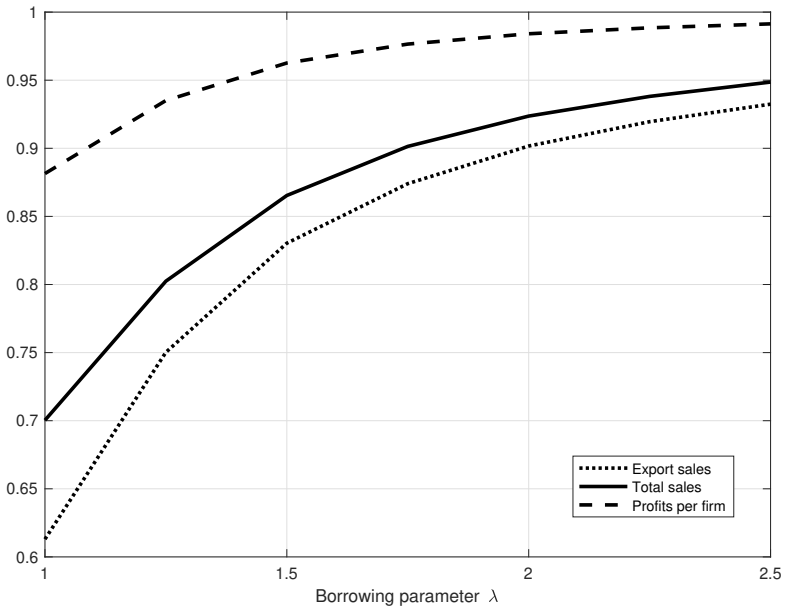
Note: Financial constraint is calculated at the intensive margin, i.e. a firm is identified as constrained if they produce less than they would with unlimited borrowing. Calculations come from varying the parameter λ in the friction model.

Figure 4 plots the values of total sales, export sales and profit per firm for different values of λ. Each value is normalized by their frictionless value when $\lambda = \infty$. As the borrowing parameter λ increases and the financial friction level decreases, these values get closer to the frictionless level. Financial frictions can reduce the values for total sales and export sales by 30% and 40%. At the firm level, profits can be approximately 12% lower.

[12] See Manova (2012), Manova and Yu (2017)

[13] Firms are identified as financially constrained if they produce less than the optimal quantity given their productivity and export status.

Figure 4: The effects of financial frictions



Notes: The horizontal axis shows different degrees of financial frictions by varying the borrowing parameter λ. Each series is normalized by their respective frictionless values when $\lambda = \infty$.

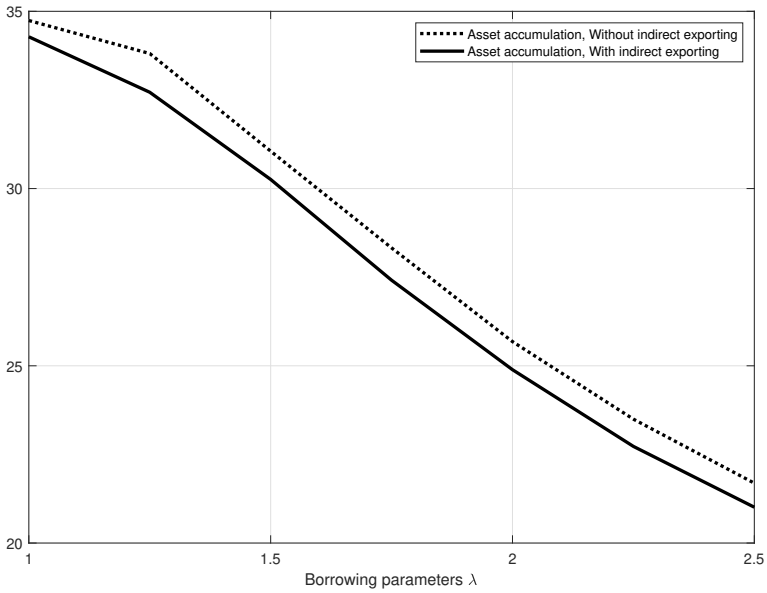
6.2 The role of indirect exporting

The last two rows of table 8 show the role of indirect exporting as λ decreases. When access to finance becomes more limited, more firms choose to be indirect exporters. Moving to financial autarky from unlimited borrowing leads to a 6.1 percentage point increase in the shares of firms as indirect exporters (9.43% to 15.52%). As a result, the share of the industry exports carried by indirect exporters also increases from 10.32% to 25.73%. As the degree of financial frictions becomes larger, the role of indirect exporting becomes even more important.

Figure 5 shows the average assets held by firms for a range of friction levels in two different scenarios: with and without indirect exporting. In both cases, as the borrowing constraint relaxes (higher λ), firms on average save less and asset accumulation decreases. Under all friction levels, firms have to save more assets when there is no indirect exporting.[14] Consider an economy that allows indirect exporting and the financial friction parameter is $\lambda = 2$. On average, a firm saves

[14] As the degree of financial friction decreases and λ increases, the gap between the two lines closes. When the borrowing constraint is completely relaxed, i.e. $\lambda = \infty$ (not shown in Figure 5), asset accumulation is the same in both scenarios with and without indirect exporting. This is because when firms have unlimited access to finance, they save the minimum amount and use the rest of their income as dividend distributions.

Figure 5: Financial frictions and indirect exporting



Notes: The horizontal axis shows different degrees of financial frictions by varying the borrowing parameter λ.

approximately 25 units. Comparing this to a scenario without indirect exporting, in order for a representative firm to save the same amount of 25 units, the degree of financial frictions must be lower (borrowing parameter must be higher $\lambda \approx 2.1$). In other words, the existence of indirect exporting as an option available to firms mitigates the severity of financial frictions as much as a 5% increase in the borrowing power.

6.3 Transition into direct exporting

In section 3, I show that there is persistence in export modes: firms are likely to maintain the same export status between periods. Firms with indirect exporting experience in the data have twice the likelihood of becoming direct exporters compared to non-exporters. In this section, I use the simulated data from the model with financial frictions to predict the transition probability for different modes of exporting. The results from the simulated data are in table 9.

The model is able to replicate the observation in the data that indirect exporters in period t are much more likely than Home firms to transition into direct exporting in period $t+1$. Indirect exporters have a probability of 0.4320 of switching to direct exporting in the frictions model

compared to Home firms' probability of 0.1559. The model without financial frictions has a similar prediction: indirect exporters' probability of becoming a direct exporter is higher than *Home* producers (0.3918 versus 0.2406). Model (a) with financial frictions performs better in matching the persistence of *Home* and direct exporters than model (b) without financial frictions.

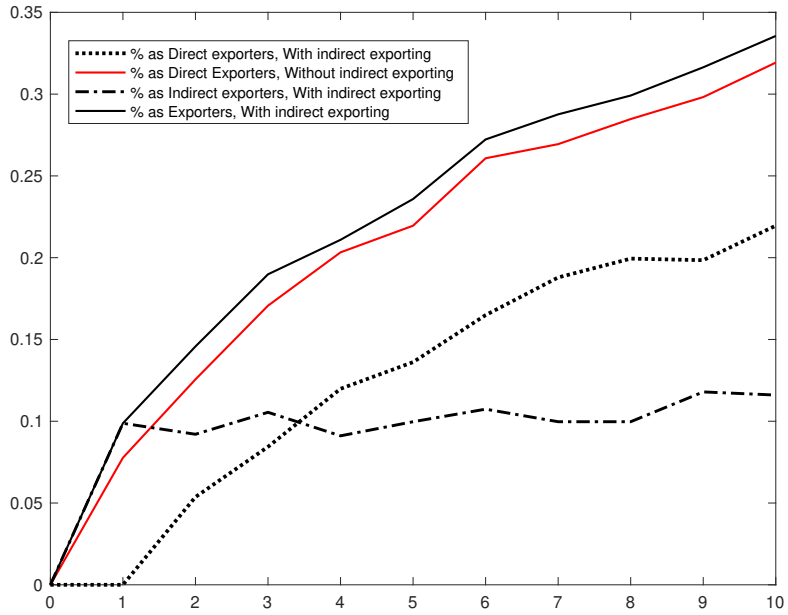
Table 9: Transition probabilities of export status (simulated data)

		Export status in period $t+1$		
Period t		Home	Indirect exporting	Direct exporting
Home	Data	0.7823	0.0806	0.1371
	Model a	0.7333	0.1108	0.1559
	Model b	0.6814	0.0780	0.2406
Indirect exporting	Data	0.3182	0.4091	0.2727
	Model a	0.4511	0.1169	0.4320
	Model b	0.5016	0.1066	0.3918
Direct exporting	Data	0.1628	0.0465	0.7907
	Model a	0.2128	0.0929	0.6942
	Model b	0.3804	0.0871	0.5325

Note: Simulated data come from the calibrated model. These moments are not targeted in the calibration.
Model (a): calibration with financial frictions.
Model (b): calibration without financial frictions.

One mechanism through which firms transition into direct exporting is asset accumulation to overcome the financial constraints. The model suggests that indirect exporting provides firms with a channel to accumulate more assets due to higher profits. To analyze the importance of the indirect exporting technology, I eliminate this channel and compare how firms transition into direct exporting. For this experiment, I track the behaviors of two identical cohorts of Home firms in $t = 0$ to $t = 10$ in two scenarios with and without indirect exporting. The firms in these cohorts have the same initial characteristics in $t = 0$, but the endogenous choices are different starting from $t = 1$ when indirect exporting is not available. All other parameters remain the same between two scenarios so that the only difference is the existence of indirect exporting. Figure 6 shows the behaviors of firms in these two cases. The dotted black line shows the share of firms that become direct exporters in each period when indirect exporting is available to firms. The red line shows

Figure 6: Switching behaviors for cohort of *Home* firms from $t = 0$



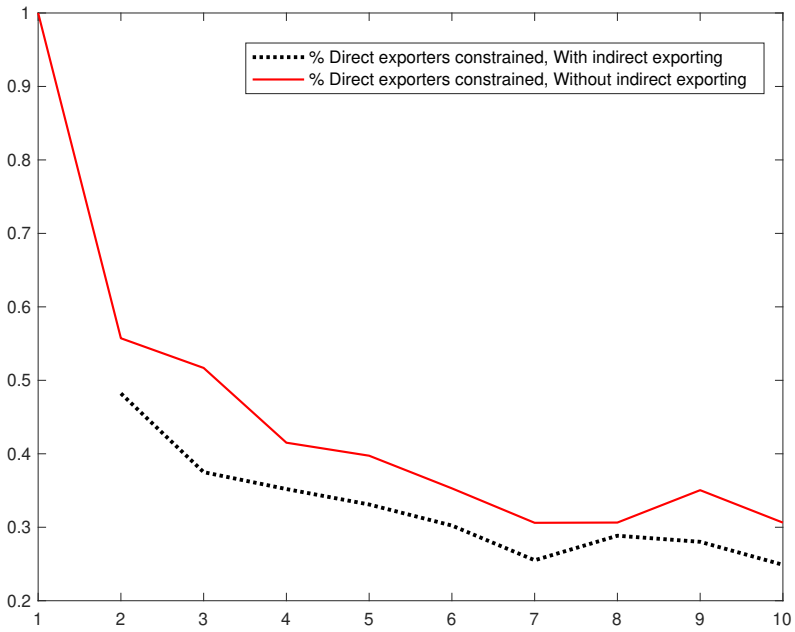
Notes: Each line shows the shares of the original cohort of Home firms in $t = 0$ that become direct or indirect exporters in each period $t = 1, 2 \ldots 10$ after the elimination of indirect exporting at the beginning of $t = 1$. The black line shows the shares of cohort as direct exporters when indirect exporting is available. The red line shows the shares of firms as direct exporters if indirect exporting is not available. Firms in two scenarios are initialized to have the same characteristics for comparison.

the same value in each period when indirect exporting is not available. The dashed black line shows the shares of the original *Home* cohort in $t = 0$ that choose to become indirect exporter in each period.

There are more firms from the *Home* cohort in $t = 0$ that become direct exporters in each period when indirect exporting is shut down, compared to when firms are allowed to trade indirectly. However, the total number of exporters is lower when there is no indirect trade. Direct exporters and *Home* producers do not change their export status between two scenarios. The only firms which change their export modes are indirect exporters in the benchmark scenario. These switching firms either become direct exporters or revert back to being *Home* producers. They also earn lower profits than they would as indirect exporters in the benchmark case.

Figure 7 plots the shares of direct exporters in each period that are constrained. Over time, as direct exporters accumulate assets faster due to higher profits, fewer of them are constrained

Figure 7: Constrained direct exporters



Notes: Each line shows the shares of the original cohort of Home firms in $t = 0$ that become direct exporters in t and are constrained. The black dotted line shows the shares of the cohort as constrained direct exporters when indirect exporting is available. The red line shows the shares of firms in the cohort that become constrained direct exporter when indirect exporting is not available. Firms in two scenarios are initialized to have the same characteristics for comparison.

by the borrowing limit. As a result, the shares of direct exporters that are constrained decrease in both scenarios.[15] However, when indirect exporting is not available, more of the direct exporters are constrained. This is because some of the direct exporters in each period would have preferred to be *unconstrained* indirect exporters in the benchmark case. The existence of indirect exporting provides these firms with a stepping stone to accumulate assets and to eventually transition into direct exporting.

7 Policy experiments

In this section, I use the calibrated model to consider three policy experiments. First, I investigate the impact of a trade liberalization on the aggregate measures such as total sales and export revenues. The second experiment considers the implications of a subsidy on indirect exporting. Lastly, I conduct a potential financial reform and investigate the impact on the industry if Vietnamese financial development was the same level as the U.S. In each experiment, I simulate the model for 10 years after the policy change and compare the results to the benchmark values in each period.

7.1 Trade liberalization

In this policy experiment, I reduce the variable trade costs (τ^D, τ^I) for both direct and indirect exporting by 5%. This can be interpreted as a 5% reduction in tariffs across the board. For comparison, I perform the same policy experiments in both models with and without financial frictions. The results are reported in table 10.

The first row shows the change in aggregate sales as a result of the policy change. The following columns report the changes compared to the benchmark values for years 1, 3 and 10 after the policy was implemented. In the first year, the increase in aggregate sales after a trade liberalization is 17.27% in the model with financial frictions (model a) and 25.08% in the frictionless model (model b). Aggregate export sales increase by 37.21% in model (a) while model (b) implies a 51.79% increase. Therefore, the economy benefits from a trade liberalization in both models. In the

[15] There are no constrained direct exporter in period $t = 1$ in the benchmark since none of the *Home* firms in $t = 0$ switch to direct exporting in $t = 1$, the only exporters in $t = 1$ from the cohort are indirect exporters.

Table 10: Trade liberalization: (variable costs decrease by 5%)

	Model (a)			Model (b)		
Year	1	3	10	1	3	10
Aggregate sales(%)	17.27	23.31	23.75	25.08	24.60	24.63
Aggregate export(%)	37.21	46.46	47.26	51.79	50.37	50.65
Home to D/I contribution (%)	45.52	42.02	42.67	45.94	44.35	45.73
Indirect to Direct contribution (%)	8.13	14.27	14.34	14.11	14.60	13.02
Average asset savings (%)	16.87	21.20	21.99	0	0	0
Export participation (pp.)	14.20	15.70	16.03	16.03	15.57	15.67
Indirect exporters fraction (pp.)	6.30	-0.53	-0.27	-0.03	-0.30	0.07
Direct exporters fraction (pp.)	7.90	16.23	16.30	16.07	15.87	15.60

Note: Results are compared to the benchmark values for each period. Both variable costs for direct and indirect exporting are reduced.
Model (a): calibration with financial frictions.
Model (b): calibration without financial frictions.

first year, the increase in sales and export sales in the financial frictions model is lower than the frictionless model (68.86% of the increase in sales and 71.85% increase in exports in model (b)). However, over the next periods, the two models arrive at relatively similar predictions. This implies that the adjustments in the model with financial frictions are more gradual compared to the sudden change in the frictionless model.[16]

Table 10 also decomposes the contribution of export status switchers to the gains from a trade liberalization compared to the benchmark case. Following a trade liberalization, the export market becomes more attractive. Therefore, no exporters in the benchmark switch to being Home producers in the counterfactual. The gains in the industry as a result of a trade liberalization come both from the increase in the export sales among incumbent exporters (direct/indirect) and producers that switch their export status (home to direct/indirect and indirect to direct exporting). In both models (friction and frictionless), more than half of the increase in aggregate exports in each period is attributed to the changes in the extensive margin, i.e. from producers that switch their export modes.

[16]This is similar to what Buera and Shin (2013) observe: financial frictions slow down the rate of reallocation compared to a frictionless economy.

In model (b), there is no difference in the average asset savings following a trade liberalization. This is because in the model without financial frictions, there is no incentive to save for borrowing in the next period, so that all firms always save only the minimum amount. In contrast, model (a) implies that trade liberalization induces firms to save even more. The average asset savings per firm increase by 16.87% in model (a) in the first year and 21.99% by year 10. Since exporting is now even more profitable than before, there is an incentive for firms to save more to export. Moreover, there is also an increase in export participation (14.20 percentage point in the first year). As exporting yields higher profits, firms are able to save more than they would as non-exporters. Additionally, direct exporters earn the highest profits and are able to save the most. Over the 10 year period, the shares of firms as direct exporters increase. These factors drive the increase in the average asset savings per firm following a trade liberalization.

7.2 Indirect exporting subsidies

In the previous sections, I show that as the degree of financial frictions increases, the role of indirect exporting becomes more important: more firms choose to be indirect exporters and a larger share of total exports is carried indirectly. I investigate a policy experiment that represents an indirect exporting promotion. Specifically, I lower the fixed cost of indirect exporting by 25%. This cost represents the per period expenditures associated with trading through an intermediary such as a warehouse cost or a search cost for a middleman. A policy that improves the infrastructure for trade intermediation (more trade intermediaries etc.) could result in a lower fixed cost of indirect exporting.

Table 11 presents the results of the policy experiment. For comparison, I perform the same policy experiment in both calibrated models with and without financial frictions. Compared to the benchmark without subsidy, when a policy of 25% subsidy on indirect exporting fixed costs is implemented, the total export revenues increases by 1.96% in the first year in model (a) with financial frictions and by 4.38% in model (b) without frictions. By year 10, the increase in sales and exports in model (a) is still lower than in model (b). Similar to the case of trade liberalization in the previous section, the existence of financial frictions leads to a lower gain compared to an industry that is unconstrained.

Table 11: The effect of an indirect export subsidy (25% reduction in fixed costs)

	Model (a)			Model (b)		
Year	1	3	10	1	3	10
Aggregate sales(%)	1.96	3.18	3.96	4.38	4.11	4.21
Aggregate export sales(%)	4.36	6.72	8.21	9.05	8.42	8.66
Average asset savings (%)	-3.61	-2.40	-1.73	0	0	0
Export participation (pp.)	22.20	22.83	22.87	23.37	23.47	23.17
Indirect exporters fraction (pp.)	50.33	52.47	51.78	42.67	43.40	42.60
Direct exporters fraction (pp.)	-28.10	-29.63	-28.90	-19.30	-19.83	-19.43

Note: Results are compared to the benchmark values of no subsidy for each period. Export subsidies are in the form of a 25% reduction in fixed costs for indirect exporting.
Model (a): calibration with financial frictions.
Model (b): calibration without financial frictions.

Following an indirect export subsidy, the export participation rate increases by 22.20 percentage point in model (a) and 23.37 percentage point in model (b) in the first year. In both models, the shares of firms as indirect exporters increase over time, while the shares of firms that are direct exporters decrease. The reason for this is that as fixed costs of indirect exporting decrease due to the subsidy, indirect exporting becomes more attractive compared to direct exporting. Therefore, some of the changes in the extensive margin comes from direct exporters in the benchmark scenario switching to indirect exporting after the policy changes. As more firms become indirect exporters and more direct exporters switch to indirect exporting, the average asset savings also decrease compared to the benchmark of no subsidy in each period. Indirect exporting serves as a substitute for savings to overcome the borrowing constraint.

7.3 Financial reform

In this section, I investigate the effects of a potential financial reform. I follow Buera and Shin (2013) and Arellano, Bai, and Zhang (2012) [17] to calculate a country's financial development as the ratio of private credit by deposit money banks and other financial institutions over GDP using the update

[17] Arellano et al. (2012) suggest measuring a country's financial development using three statistics: (1): average private credit to GDP ratio, (2) banks' overhead costs as share of total assets and (3) the percentage of adults included in the public and private credit bureaus.

Table 12: The effects of a financial reform

Year	1	3	10
Aggregate sales (%)	3.05	1.95	1.97
Aggregate export sales (%)	4.31	2.73	2.89
Export participation (pp.)	0.57	0.27	0.60
Indirect exporters fraction (pp.)	-2.27	-1.67	-1.17
Direct exporters fraction (pp.)	2.83	1.93	1.77
Average asset savings (%)	-49.62	-49.95	-49.79
Fraction of firms constrained (pp.)	-14.47	-8.07	-6.93

Note: Results are compared to the benchmark values for each period. Financial reform is a result of relaxing the borrowing parameter by a multiple that represents the relative financial development between Vietnam and the U.S.

of the database from Beck, Demirgüç-Kunt, and Levine (2000) in 2019. I compare this indicator between Vietnam and the U.S, a country with a highly developed financial market, from 2005 to 2015 (the years in the World Bank Survey sample) to calculate the relative financial development between two countries.[18] To conduct a financial reform experiment, I multiply the borrowing parameter λ by the relative difference between the U.S and Vietnamese financial development. The results of this experiment are in table 12.

After a financial reform, a firm does not have to save as much asset to overcome the constraint as they would in an economy with higher financial frictions. Therefore, over the 10 year period, the average asset savings decrease by about 50 percentage. Export participation increases only by a marginal amount (0.57 percentage point in the first year and 0.60 percentage point by year 10). As the degree of financial frictions decreases, the share of firms as indirect exporters decreases while the share of firms as direct exporters increases. This demonstrates the effects as described in section 6.2: the role of indirect exporting diminishes as financial frictions become less severe.

The impact on aggregate sales, aggregate exports, and proportion of constrained firms illustrates the effect of a financial reform in both the short and medium term. Following a larger jump in the first period, a financial liberalization has diminished but persistent effects. In the first year after

[18]The average external finance ratio of the U.S. between 2005 and 2015 is 1.83, while that of Vietnam is 0.84. This implies that the U.S financial development is 2.18 times that of Vietnam.

the reform, aggregate sales increase by 3.05% while export sales increase by 4.31%. The fraction of firms that are constrained decreases by 14.47 percentage point. By year 10, the magnitude of the change gets smaller: aggregate sales increase by 1.97% and export sales increase by 2.89%. A financial reform gives constrained firms a boost in the first year. Over time, firms in the benchmark scenario with more severe financial frictions grow and catch up so that the difference due to the financial reform is less than in the first year of the reform. Overall, the industry still benefits from a financial reform as sales and exports increase relative to the benchmark case.

8 Conclusion

In this paper, I investigate how financial frictions distort firm's export behaviors and the role of trade intermediation in alleviating such frictions. I incorporate a borrowing constraint and two channels of exporting into a standard international trade model in Melitz (2003). I show that due to financial frictions, the decision to export is a function of both a firm's productivity and their assets. The model is calibrated using a firm-level dataset on Vietnamese firms from 2005 to 2015. I show that indirect exporting is a platform for firms to transition into direct exporting. Firms with indirect exporting experience are more likely to become direct exporters than non-exporters. This is because they earn higher profits from indirect exporting and accumulate assets faster. As financial frictions become larger, the role of indirect exporting becomes even more important: more firms become indirect exporters and more of total exports are carried indirectly.

Using the calibrated model, I perform three policy experiments of lowering the trade costs (trade liberalization), lowering the indirect exporting costs (subsidy) and a financial reform. I show that financial frictions lower the gains from trade liberalization in the first year after the policy is implemented by 31% but the difference decreases over time. I find that indirect exporting serves as a substitute for access to external financing. As financial frictions increase, the share of firms as indirect exporters increases as well. A 25% subsidy for indirect exporting further reduces the average assets that a firm must save by 3.61% in the first year with smaller but persistent effects in the years after that.

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