Financial Development, Financial Specialization, and Trade

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April 2025

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Abstract

Banks differ in specialization. We study the aggregate and distributive effects of financial development in a heterogeneous-firm model where firms can produce for domestic and foreign markets and banks specialize in monitoring firms' domestic or foreign activities. Internationally oriented banks promote the growth of larger incumbent exporters. Locally specialized banks enable financially vulnerable firms to enter foreign markets but induce incumbent exporters to focus on domestic markets and lower their export intensities, fragmenting the export sector. The quantitative analysis reveals that financial development boosts total output, moderates inter-firm inequalities driven by internationalization, but may reduce aggregate trade. The predictions are supported by evidence from a major Italian banking deregulation.

JEL Classifications: E44, F4, G21, G28, O16
Keywords: Financial Development, Banking Specialization, International Trade, Credit

1 Introduction

Financial development, such as improvements in the depth and efficiency of the banking sector, can foster firms' internationalization. Banks can help firms finance the costs of entry into foreign markets as well as the costs associated with the expansion of existing foreign market presence (Manova 2013; Paravisini et al. 2015). The influence of financial development on the internationalization of firms is then at the forefront of policies aimed at promoting trade (Foley and Manova 2015). However, the size and development of the banking sector mask significant heterogeneity in banks' specialization, with possible first-order effects on the real economy (Paravisini et al. 2023; Blickle et al. 2023; De Jonghe et al. 2020; Berger et al. 2017b; Liberti et al. 2017). Banks with a national and multinational scope operate alongside regional, savings, and community banks. In the euro area countries, for example, the average asset share of local and community banks amounted to a significant 20% in 2020, exhibiting a wide cross-country variation (Appendix Figure A1). The cross-country heterogeneity in bank specialization is also driven by cross-country differences in the regulations of domestic and foreign banks (Appendix Figures A2 and A3).

Banks' specialization, as reflected in their lending technologies and in the functional and geographical distance between lending decision centers and borrowers, shapes banks' ability to screen and monitor heterogeneous firms (Degryse and Ongena 2005; Liberti and Mian 2009). While a locally oriented bank can have an advantage over a multinational bank in financing domestic activity, the reverse can be true for export activity. This leads to fundamental questions: when does financial development promote trade? In what scenarios do the effects of financial development on overall economic activity align with those on trade? And, in a distributional perspective, how does financial specialization affect the internationalization of different types of firms?

We investigate these questions theoretically and empirically. We show that financial specialization can help explain important patterns of firms' internationalization, of the distribution of export intensity across firm size classes, and of the participation in, and concentration of, the export sector. Financial development relatively skewed towards the expansion of banks with local specialization can encourage export entry, particularly among smaller firms. However, this "democratization" of export can come at the cost of a lower propensity of incumbent exporters to expand exports, causing a stronger fragmentation of the export sector. Due to these conflicting forces, in contrast with a naively benign view, financial development may well boost total output but a priori has an ambiguous impact on trade.

To address our research question, we develop a Melitz (2003)-style model of international trade with heterogeneous firms and a heterogeneous banking sector. We then study qualitatively and quantitatively the effects of financial development driven by financial liberalization and verify the consistency of the model's predictions with the effects of a major financial liberalization, the Italian banking deregulation of the 1990s. In the model economy, firms pledge their sales revenues and inventory assets to banks. Since firms can strategically default on loans, the pledgeability of resources is imperfect; banks' monitoring enhances this pledgeability. Building on established literature in banking, banks' monitoring has a twofold role: banks monitor borrowers to increase the liquidation value of pledged assets (Diamond and Rajan 2000; Habib and Johnsen 1999) and, by acquiring knowledge of borrowers, they also become able to deter strategic default (Holmstrom and Tirole 1997). In this setting, financial development comes through innovations to banks' monitoring efficiency. However, financial development is not monolithic: banks' monitoring is specialized in the market of destination of the pledged resources. Intuitively, a bank's efforts to repossess and find a buyer for pledged domestic inventories will be quite different from its efforts to do the same for pledged inventories shipped overseas.

Calibrating the model to Italian firm and local banking markets data, we find that the effects of financial development on export are ambiguous a priori and depend on the type of financial development and on firms' financial vulnerability. Consider locally specialized financial development (an improvement in banks' ability to monitor the domestic market). This boosts firms' pledgeable resources, inducing financially vulnerable firms to expand in all markets of activity and leading others to increase the number of markets in which they operate. However, for exporters that do not lack for pledgeable income, locally specialized bank monitoring only serves to reduce the relative cost of financing domestic activities. These firms will reallocate investment funds from the foreign to the domestic market, chasing the now-relatively higher return to investment. Intuitively, when bank monitoring of domestic activities becomes less costly, an exporter is affected in two ways. First, the pledgeable income increases due to enhanced monitoring (a pledgeable income effect similar to Holmstrom and Tirole 1997). This expands the borrowing capacity and the ability to serve foreign markets. Second, the cost of financing domestic operations becomes cheaper relative to export (a substitution effect), due to banks' ability to extract more value from pledged domestic inventories (in line with Diamond and Rajan 2000). For financially vulnerable firms, the pledgeable income effect dominates; for financially healthy firms, the substitution effect dominates. To determine which effect dominates in aggregate and over the firm size distribution, we perform financial policy counterfactuals.

We obtain that an increase in the branch presence of banks with local specialization of magnitude similar to that induced by the Italian bank deregulation[1] of the 1990s promotes firm participation in domestic and export markets, increasing the probability of exporting by 0.4%. However, this shock generates substitution effects for incumbent exporters that induce a 0.5% average reduction in the export share of sales. The substitution effects on the intensive margin of incumbent exporters quantitatively dominate the positive effects on the extensive margin. This causes a 0.7% decrease in aggregate exports, while total output rises by 0.5%. In a nutshell, locally specialized financial development promotes export entry, making it easier for smaller, less productive firms to compete internationally with larger, more productive firms, but reduces aggregate trade flows. In contrast, an increase in the presence of all banks (with local or non-local specialization) such as that induced by the deregulation of the 1990s boosts aggregate exports by 2.9%, raises total output, but shrinks industry participation and exacerbates interfirm inequality.

We verify the consistency of the model's main predictions with the empirical effects of the Italian bank deregulation. The removal of the historical 1936 banking regulation not only deep-

1. During the 1990-97 period, the regional density (branches per population) of locally specialized banks in Italy increased by about 40% and 55% for banks overall.

ened the presence of banks in the local (provincial) credit markets but also had a large impact on the composition of those markets. Using a detailed survey of manufacturers and precise information on their local banking markets and on their reliance on locally headquartered banks, we find that the specialization of the banking sector influences firm export entry and intensity in a way consistent with the model's predictions. In particular, increased access to banks with a local specialization due to the bank deregulation is associated with an increase in export participation (extensive margin) for firms vulnerable to financial frictions, but it appears to depress the intensive export margin for financially healthy firms. These effects of locally specialized financial development contrast with those of the overall degree of financial development (deepening in the presence of all banks, with local or non-local specialization), which boosts export participation to a lower extent but promotes incumbent exporters' expansion in foreign markets.

We next use the model to perform a counterfactual experiment in which we reduce trade costs and compare the aggregate and distributive effects of financial development with those induced by a reduction in trade barriers (trade liberalization). As Figure 1 shows, the export response magnitudes generated by a 10% increase to financial development of either kind are comparable to the response magnitudes induced by a 1% reduction in the net iceberg trade cost.[2] The differences in shape and sign between the export response distributions can be striking, particularly between the trade shock and the shock to locally specialized financial development. For example, the trade and locally specialized financial shocks respectively generate 49.8% and 50.8% increases in the contribution of the smallest decile of firms to aggregate exports. In contrast, for the largest decile of firms the trade shock generates a 0.4% increase to relative exports whereas the locally specialized financial shock generates a 0.2% decrease.[3] These results confirm that one cannot

2. Details on Figure 1 will be provided in Section 6.2.

3. In the analysis, we also study the effects of joint trade and financial shocks, capturing scenarios in which trade liberalization and financial liberalization occur at the same time.

abstract from banks' specialization when studying the impact of financial development on firms' internationalization and trade.

Related Literature The paper speaks to three research strands. It relates to the large literature that investigates the real effects of financial development and especially to the growing strand of studies on the impact of financial specialization. Financial development can affect real activity through the ease with which firms can access credit to participate in domestic or foreign markets (Guiso et al. 2004; Do and Levchenko 2007; Bilir et al. 2019; Bircan and De Haas 2020). Leibovici (2021) studies the effects of financial development on trade in a multi-industry model where industries differ in their external financial dependence. A growing strand of empirical work documents banks' regional/sectoral specializations (Berger et al. 2017a; Berger et al. 2017b; Liberti et al. 2017; De Jonghe et al. 2020; Acharya et al. 2006; Duquerroy et al. 2022; He et al. 2023) and examines the implications for firms' investment and production decisions and for real activity (Saidi and Streitz 2021; Giannetti and Saidi 2019; Cetorelli and Gambera 2001; Dell'Ariccia et al. 2021; Giometti and Pietrosanti 2022; Cornaggia et al. 2015).[4] Recent works look at credit substitutability in the context of export activity (Caballero et al. 2018; Paravisini et al. 2023). In our analysis, we provide theoretical foundations for the imperfect substitutability between different sources of specialized bank finance, and study qualitative and quantitative implications for trade and output in aggregate and over the firm size distribution.

The analysis also relates to the literature that investigates the nexus between finance and trade. Previous studies predict that financial frictions generally reduce export (Manova 2013; Antràs and Foley 2015; Caggese and Cuñat 2013) and test this prediction (Bricongne et al. 2012; Chor and Manova 2012; Minetti and Zhu 2011; Muûls 2015). Recent works have studied empirically how banking structures affect export (Paravisini et al. 2015; Michalski and Ors 2012;

4. For early theoretical work on the effects of banking specialization, see, e.g., Boot and Thakor (2000).

Amiti and Weinstein 2011). Our analysis examines theoretically and empirically the interplay between financial development and bank specialization. We show that, through this interaction, financial development has ambiguous effects on - and may sometimes discourage - trade, while boosting total output and moderating inter-firm inequalities driven by internationalization.

Finally, the paper speaks to the literature on the structural and policy determinants of internationalization. Prior studies have examined frictions that can explain why export entry is often accompanied by exporters' tendency to remain small (Ruhl and Willis 2017). In Eaton et al. (2021) firms face search and learning costs in foreign markets after entering export. Albornoz et al. (2012) highlight informational frictions: small exporters engage in sequential export, testing the ground before expanding their activity. Our paper proposes an explanation based on financial factors, namely, the distributional effects of financial development and financial specialization.

The paper unfolds as follows. Section 2 provides an overview of the major Italian banking deregulation of the 1990s and describes the data that inform our calibration and quantitative analysis. Section 3 presents the model and Section 4 outlines its calibration. Section 5 studies the effects of financial development, also evaluating the model's predictions through the lens of the empirical effects of the Italian deregulation. Section 6 performs counterfactual experiments to study quantitatively the impact of the bank deregulation on trade and production and to contrast it with that of a trade liberalization. Section 7 concludes. Proofs and additional results are relegated to the Online Appendices.

2 Data and Empirical Motivation

The major Italian financial deregulation of the 1990s furnishes an ideal setting for investigating the effects of different types of financial development on export. Bank credit is the predominant form of external financing in Italy.[5] Banks exhibit wide heterogeneity in specialization: in recent years banks with a national and international focus accounted for three quarters of the branches, while one quarter were operated by banks with local specialization (e.g. community, savings, cooperative, and mutual banks) (Bank of Italy 2020). Further, the deregulation of the 1990s offers proxies for shocks to the development of these different bank categories.

2.1 Internationalization amid the Historical Banking Policies

The Italian manufacturing sector features a large importance of small and medium-sized firms (SMEs). Since the 1990s, small manufacturers have increasingly gained access to foreign markets: particularly in the late 1990s and early 2000s, the number of small exporters rose in all industries (De Nardis and Pappalardo 2005). However, this has not necessarily been accompanied by the expansion of incumbent exporters' foreign sales: the fraction of firms with small export sales share grew sharply in the late 1990s and early 2000s. In particular, after entering foreign markets, medium-sized firms were often reluctant to increase their export scale (Intesa San Paolo 2016).

Due to the relevance of distance, Italian SMEs borrow especially from banks in their local (provincial) markets (Guiso et al. 2004).[6] In 1936, Italy introduced a banking law that restricted banks' geographic expansion. Savings banks could expand within the regions they had already established themselves by 1936; commercial and cooperative banks were confined to the provinces in which they already operated; national banks could only expand in major cities. As we will explain below, a province's degree of exposure to these restrictions was plausibly exogenous to the economic development of the province in 1936. Beginning in the mid-1980s, the government passed major banking reforms. By 1990, all restrictions on bank branch expansion had been

5. Corporate bond and equity markets have traditionally been underdeveloped. During the 2010s, for instance, there were on average little more than 300 publicly listed companies in Italy.

6. There were 95 provinces in Italy in the 1990s. Provinces are similar in size to U.S. counties. A region comprises multiple provinces.

eliminated. In 1993, the government implemented the EU's Second Banking Directive, which facilitated entry into local banking markets by EU-member banks.

In short, the financial liberalization that occurred in the late 1980s and the 1990s generated a provincial variation in the development of different categories of banks that was plausibly exogenous to the economic development of the provinces.

2.2 Data and Patterns

Our main data source is the "Indagine sulle Imprese Manifatturiere", a survey carried out by the Italian bank Mediocredito Centrale. We use the 1995-97 wave, which covers a three-year period ending in 1997, but, when feasible, verify the results also using the 1998-2000 wave.[7] The data set includes a representative sample of Italian manufacturers with 10 to 500 employees (95.5% of the firms in the sample) and the universe of manufacturers with more than 500 employees. In total, 4,490 firms were interviewed, which represents about 10% of the population in terms of employees and value added. The survey provides detailed information on export, firms' characteristics, and sources of finance, including firms' reliance on banks headquartered in the local (provincial) territory. We match the survey with balance sheet data from BvD-AIDA. We also employ Bank of Italy data on the presence of banks in local (provincial) markets and data from the Italian National Statistics Office (ISTAT) on the population of provinces. Appendix Table A1 displays summary statistics while Appendix Table A2 details definitions and data sources. About 70% of the firms are located in the north of Italy, while 17% are in the center and 13% in the south. The average size is medium (117 employees, with a median of 33). In 1997, 66% of the firms exported. 63.5% of the firms export to the EU-15, 11.6% to Russia and Central-Eastern Europe, 11.7% to

7. The subsequent 1998-2000 wave contains only information on firms' extensive export margin. We will then use it in robustness analysis on extensive margin effects. The Mediocredito survey has been used in previous work to investigate the dynamics of firms in Italy (see, e.g., Angelini and Generale 2008).

the United States and Canada, 8.5% to Asia excluding China, 2.4% to Africa, 1% to Oceania and China. As shown in Appendix Figure A6(c), the ratio between the number of exporters and the total number of firms is higher in the north than in the center or south. Conditional on exporting, the share of foreign sales equaled 38.5%.[8]

We seek to identify deregulation-driven shocks to the local development of banking services, differentiating among bank types. Cooperative, popular, savings, and mutual and artisans' banks have local specialization (Bank of Italy, 2010). To capture the deepening of their presence, we consider the annual percentage change of their branches in a province, imputed as the average in the 1991–1997 deregulation period. The mean growth of locally specialized branches was 4.4%. We also consider the development of all banks, with local or non-local specialization. We measure it through the annual percentage change of all bank branches in a province, averaged over the 1991–1997 period. The mean growth of all bank branches was 7.5%.

Bank branch density is a standard measure of banking development in the literature (Degryse and Ongena 2005). It captures the demographic penetration of banking services in provincial credit markets (the key credit markets for Italian businesses), proxying (inversely) for the average distance between banks and firms, and, by extension, for loan officers' ability to monitor firms (Petersen and Rajan 1994; Benfratello et al. 2008). In the Mediocredito survey, in fact, 77% of the firms declared that a dense network of bank branches in the province is essential for the information flow between the firm and its lending bank(s).[9] Crucially, this measure also allows us to distinguish between the development of locally specialized and non-locally specialized banks, that is, to capture different types of financial development. This distinction would be precluded if, for example, we used the measure of financial development proposed by Guiso et al. (2004) for

8. On average foreign sales were 1.16 million euro.

9. The firms are asked whether the proximity of bank branches and the frequency of in-person visits to the branches are important for the activity of the bank in screening and monitoring the firm.

the Italian context, which focuses on the intensity of household rationing in Italian provinces.

Appendix Figure A4 plots measures of banking development and specialization and firm export participation and export sales in Italian provinces around the deregulation of the 1990s. The provinces exhibit wide variation. For example, the northern province of Trento and the southern Sicilian provinces exhibit a strong development of locally specialized banks, while they rank much lower for overall development of all banks. The opposite holds for the southern provinces of Puglia. These differences largely reflect the different impacts of the historical bank regulation of 1936. The figure also suggests key patterns: the overall banking development in a province positively correlates with firms' internationalization both at the extensive and intensive margins (Panels A and C),[10] while locally specialized banking development correlates positively with export participation but negatively with export intensity (Panels B and D). These patterns are more pronounced when one focuses on provinces in which a larger share of firms[11] declare that they rely on banks headquartered in the province (red scatter plots and fitted lines).

In Section 5.2, we will exploit the quasi-experiment offered by the Italian bank deregulation to test the consistency of the model's predictions with the empirical effects of banking development and specialization on firms' extensive and intensive export margins. In Section 6, we will use the model calibrated to the Italian data to study quantitatively the effects of the Italian deregulation on trade and production in aggregate and over the firm size distribution.

3 The Model

We consider a heterogeneous-firm Melitz (2003)-style model in a symmetric, two-country industry setting with banks and credit frictions. Banks monitor the activities of borrowing firms in the

10. Appendix Figure A5 shows that the patterns are confirmed when relating banking development and specialization in the 1990s with export in the provinces roughly two decades later, in 2010.

11. As a threshold, we consider 60%, the average share of firms reliant on locally headquartered banks.

domestic and foreign markets, mitigating credit frictions: they curb borrowers' incentives to engage in diversion of funds (Holmstrom and Tirole 1997) and they enhance the salvage value of borrowers' collateral assets (Diamond and Rajan 2000). Financial development is modelled as shocks to banks' monitoring efficiency. The modelling of banks' monitoring enables us to capture banks' heterogeneous specialization and the effects of different types of financial development.

3.1 Environment

Since the two countries are symmetric, we focus on "Home" and use the subscript d to denote the domestic (Home) market and x to denote the export (Foreign) market.

There are three types of agents in the Home country: households, firms (entrepreneurs), and banks. Households consume final good varieties and supply labor to firms and to banks. Firms produce final goods using labor. To finance production, they can borrow from banks. There are a large number of risk-neutral deep-pocketed banks that can finance firms or alternatively invest funds in a storage technology with net return r. Banks use labor to monitor firms (e.g., as loan officers). Labor is the numéraire.

3.1.1 Households and Firms

Households Households in market $m \in \{d, x\}$ have CES preferences over varieties of an industry good, which are produced by market-m firms (Θ_m) or market-$\neg m$ exporters ($\Theta^x_{\neg m}$). Households' utility from consumption reads:

$$U = \mathbb{Q}_m = \left[\int_{\theta \in \Theta_m} q_d(\theta)^{\frac{\sigma-1}{\sigma}} d\theta + \int_{\theta \in \Theta^x_{\neg m}} q_x(\theta)^{\frac{\sigma-1}{\sigma}} d\theta \right]^{\frac{\sigma}{\sigma-1}} \tag{1}$$

where $\mathbb{Q}_m$ denotes aggregate consumption in market m on all final good varieties $q_m(\theta)$ and θ indexes a particular variety. Expenditures on variety θ in market m are:

$$R_m(\theta) = p_m(\theta)q_m(\theta) = A\mathbb{P}_m^{\sigma-\eta}p_m(\theta)^{1-\sigma}$$
$$\text{where} \quad \mathbb{P}_m = \left[\int_{\theta\in\Theta_m} p_d(\theta)^{1-\sigma}d\theta + \int_{\theta\in\Theta^x_{-m}} p_x(\theta)^{1-\sigma}d\theta\right]^{\frac{1}{1-\sigma}}. \tag{2}$$

In (2), $p_m(\theta)$ is the price of variety θ in market m, A is an exogenous demand shifter for the aggregate industry good, η is the industry price elasticity of demand, and $\mathbb{P}_m$ is the price index for the industry.[12] Besides deriving utility from consumption, households derive linear disutility from labor supplied to firms and to banks.[13]

Firms: Production Technology and Financing Entrepreneurs produce sector-specific final good varieties using a single input, labor, in a constant returns to scale technology. By paying a sunk effort cost f_e a firm receives a draw $\theta = \{\varphi, W, F_d, F_x\}$ from a joint pdf $G(\theta)$, which is composed of labor productivity φ, liquid assets W, and fixed costs F_d and F_x for the domestic and export markets.

To begin producing for the domestic market, a firm must pay a fixed overhead cost F_d; to enter the export market, a firm must pay F_x. Further, in order to produce for market $m \in \{d,\, x\}$, a firm must incur a shipping cost that scales production labor costs by $\tau_m \geq 1$. Accordingly, a firm's total costs are:

$$TC_\theta(q_m) = \sum_m \left[\underbrace{\frac{\tau_m q_m(\theta)}{\varphi}}_{I_m} + F_m\right]. \tag{3}$$

A firm can choose between two technologies: good and bad. Under the good technology, production succeeds with probability $\gamma \in \{0, 1\}$ in all markets of activity; with probability $(1-\gamma)$ production fails. Under the bad technology, production in all active markets fails with certainty; however, the use of the bad technology allows the entrepreneur to divert production resources

12. Subscript m is dropped from the price hereforth due to model symmetry.
13. This implies that the wage rate is fixed in the economy.

for her private benefits (more on this below).

To begin production in any market, a firm must pay fixed and variable production costs. A firm is endowed with a stock of liquid assets $W \geq 0$. The firm can also take out a loan from any one of a number of deep-pocketed banks in the firm's area. Since there is competition among banks, the firm can make a take-it-or-leave-it offer to a bank. A debt contract is of the form

$$D = \{L, \{q_d + F_d, q_x + F_x\}, R_b, K\} \tag{4}$$

where L is the loan principal; $\{q_d, q_x\}$ a promised allocation of funds per active market; R_b the promised repayment to the bank; and K the allocation of collateral liquidation rights over the firm's inventories in the event of default (with $K = 1$ if the bank is granted the right to liquidate the borrowing firm's inventories, and $K = 0$ otherwise).

3.1.2 Banks

Production returns are not perfectly pledgeable - since an entrepreneur chooses the technology after signing a debt contract, the lender bank cannot be sure that the entrepreneur will not strategically default (choose the bad technology) to consume private benefits. As in Burkart and Ellingsen (2004), we call this activity "diversion".

A bank is not a passive participant in a loan. By monitoring the borrower, in the event of default the bank can recover a fraction of the inventory value of the firm's goods over which it has liquidation rights. Formally, a bank uses labor ℓ_m to monitor the activity of the borrower in market m. If a borrower with a total investment $V = \sum_m W_m = \sum_m \{I_m + F_m\}$ invests I_m in market-m inventory, the bank can recoup a fraction $b_m \in [0, 1)$ of the value of market-m collateralized inventory in case of default, where

$$b_m = \frac{\sqrt{\ell_m^2 + 4V\beta_m \ell_m} - \ell_m}{2V\beta_m}. \tag{5}$$

In (5), β_m indexes the efficiency of market-m monitoring, providing the source of heterogeneity in bank specialization. We call improvements in the efficiency of monitoring domestic sales "locally specialized" financial development and improvements in the efficiency of monitoring foreign sales "non-localistic" financial development.

Since contracts are conditioned on the allocation of funds to each market, a firm is restricted to diverting market-m funds using the market-m diversion technology. With this in mind, we see that monitoring also mitigates moral hazard. By monitoring the borrower's market activities, a bank can reduce the payoff from diversion

$$\pi_{\text{diversion}} = \sum_m \{(1-b_m)\underbrace{(I_m + F_m)}_{V_m}\} - E, \tag{6}$$

where $E \leq W$ is the amount of own liquid funds invested by the firm in production.

We show in Appendix C that, to obtain a loan, a firm must grant collateral liquidation rights to the bank ($K = 1$).[14] We further prove that an entrepreneur will only receive a loan if the debt contract incentivizes the firm to choose the good technology. This leads to the entrepreneur's incentive compatibility constraint:

$$\gamma\left(\sum_m R_m - R_b\right) - E \geq \sum_m (1-b_m)V_m - E, \tag{7}$$

where R_m denotes market-m revenues and R_b is the agreed repayment to the bank. The incentive constraint requires that the entrepreneur's payoff under contract D generates returns no lower than the net returns from diversion (choice of the bad technology).

Finally, we remain agnostic about to whom banks sell liquidated inventories, as we are not interested in making claims about the output share accounted for by liquidated collateral. Thus, we simply posit that banks consume the liquidated inventories.

3.1.3 Timing

The timing of the model can be summarized as follows:

14. This is why we subtract off the equity investment term E.

i) entrepreneurs decide whether to produce and, if so, whether to export or produce solely for their domestic market;

ii) each entrepreneur offers a bank a debt contract D; the bank accepts or rejects the contract;

iii) banks choose monitoring labor (ℓ_d, ℓ_x) for the domestic and foreign markets;

iv) entrepreneurs choose between the good and the bad technology;

v) entrepreneurs' production efforts succeed or fail; all agents' payoffs are realized and agents consume.

3.1.4 Bank Monitoring and Specialization

We further elaborate on the properties of banks' monitoring. Later in the analysis, we will discuss the relevance of these properties for the mechanisms of the model.

Dual Functions of Bank Monitoring Prosecuting collateral assets and developing a pool of asset buyers requires knowledge of production technologies and of the characteristics of the assets. The more labor dedicated to these activities, the more likely a bank identifies a higher-surplus match after a borrower defaults (Diamond and Rajan 2000; Habib and Johnsen 1999).

It is also reasonable that loan officers' collateral scrutiny (the bank as a "collateral expert") raises the likelihood that the bank can deter borrower diversion and liquidate the firm before more value is destroyed (the bank as a "night watchman"; Holmstrom and Tirole 1997). In our setting, the use of the bad technology entails production failure with certainty, which will likely manifest itself in the quality of pledged collateral:

> "in a secured loan [...] you need to understand what the condition of the collateral is,' says Kent DeHart, senior vice president of $350 million-asset First Utah Bank in Salt Lake City. DeHart learned this firsthand early in his career when dealing with a restaurant loan that was in default. The borrower had disappeared. While planning a site visit, DeHart learned that

the landlord suspected there had been drug dealing from the restaurant. [...] Upon entering, they found a basement littered with miscellaneous drug paraphernalia. DeHart came away from the experience convinced he needed to make site visits a priority (Sears 2019)."

Specialization of Bank Monitoring Bank monitoring may require different efforts based on the destination market of the collateralized inventory. First, repossession of export inventory may require interacting with a different legal jurisdiction. Second, efforts to establish a pool of potential asset buyers will depend on the destination of the inventory assets. And monitoring of diversion activities will likely look different in case of borrower internationalization (see also Appendix D for further evidence). As such, we feel justified in separating export monitoring from domestic monitoring.

3.2 Debt Contracts and Aggregate Equilibrium

Recall that a debt contract is a tuple $D = \{L, \{q_d + F_d, q_x + F_x\}, R_b, K\}$ where L is the loan; $\{q_d, q_x\}$ a promised allocation of funds per active market; R_b the promised repayment to the bank; and K the allocation of liquidation rights. The equilibrium contract maximizes an entrepreneur's expected profits while satisfying the entrepreneur's incentive compatibility constraint and the bank's participation constraint. We begin by establishing existence, uniqueness, and properties of the equilibrium for a firm - bank pair.

Proposition 1. A unique[15] subgame-perfect Nash equilibrium exists. Proof in Appendix C.

Lemma 1. In the SPNE, a firm appropriates all surplus. Proof in Appendix C.

Corollary 1. The SPNE allocation is constrained Pareto-efficient and can be obtained by solving

15. Our statement on uniqueness ignores pathological cases in which the firm receives no external financing (i.e., $\{L, R_b\} = \{0, 0\}$), since $\{q_d, q_x\}$ can take any value in the reals and be an equilibrium.

the following maximization program:[16]

$$\max_{p_m,\ell_m,E} \pi_e = \max_{p_m,\ell_m,E}\{\sum_m\{\gamma R_m + (1-\gamma)C_m - V(1+r)(1+\Psi)\} + rE\}$$
$$\text{subject to: } \pi_e \geq \sum_m (1-b_m)V_m - E; \quad E \leq W. \tag{9}$$

Proof in Appendix C.

We can now consider aggregation. An industry equilibrium is a price $\mathbb{P}$ and a mass of firm entrants M_e such that: (i) firms choose market prices p_m and banks choose monitoring labor (ℓ_d, ℓ_x) for the domestic and foreign markets to maximize profits; (ii) firms' choices p_m aggregate to $\mathbb{P}$; and (iii) the mass of entrants is such that aggregate profit equals the aggregate cost of entry, that is, $\Pi = M_e F_e$. This final condition ensures that the mass of firms that generates the industry equilibrium induces an aggregate outcome that leaves each potential entrant indifferent about entering the industry.

3.3 Dissecting the Effects of Financial Development

We are interested in the effects of financial development in an environment with heterogeneous financial specialization. A "locally specialized financial deepening" will refer to an increase in the efficiency of banks' domestic monitoring; a "non-localistic deepening" will refer to an increase in export monitoring efficiency. As the objective function is transcendental, we cannot obtain closed-form solutions for agents' responses. We then calibrate the model and simulate an industry to perform counterfactuals. Before presenting the results, we build intuition for the mechanisms.

16. The following shorthand will be useful in what follows:

$$I_m = c\tau_m q_m; \quad \tau_d \equiv 1; \; V_m = I_m + F_m; \; C_m = b_m I_m; \; \Psi = \sum_m \psi_m \tag{8}$$

3.3.1 Firm-Level Effects

Pledgeable Income Effect The incentive compatibility constraint in (10) captures the condition required to induce a firm to choose the good over the bad technology:

$$\overbrace{\sum_m \{\gamma R_m + (1-\gamma) b_m I_m\} - V(1+r)(1+\Psi) + rE}^{\pi_{\text{good}}} \geq \overbrace{\sum_m (1-b_m)V_m - E}^{\pi_{\text{bad}}} \tag{10}$$

Financial heterogeneity comes from the term β_m, which indexes the market-m monitoring technology of a bank and is contained in the b_m and the Ψ terms in (10).

By Lemma 1, the firm captures all surplus - including the surplus generated through the bank's liquidation technology. On the left-hand side of (10), the firm's profits under the good technology comprise: (i) the expected sum of revenues from all the markets the firm participates in; (ii) the expected sum of all liquidation proceeds; (iii) the negative of the total investment in both markets V, scaled by the bank's cost of funds $1+r$ and monitoring $1+\Psi$; and (iv) the financing charge the firm saves by investing its own liquid assets. The right-hand side of (10) captures the "profits" under the bad technology. By investing its own funds E, the firm is able to induce the bank to offer a loan. The downside under the bad technology is that the firm will allow the bank to liquidate its collateral - the value of which includes its original equity investment. Positive shocks to banks' monitoring efficiency (that is, shocks to β_m) will increase the left-hand side of (10) while decreasing its right-hand side.

Rearrangement of the incentive constraint yields a second condition, that the firm's pledgeable assets be large enough to ensure repayment of loan terms:

$$\underbrace{\sum_m \{\gamma R_m - (1-b_m)V_m\}}_{\text{expected pledgeable income}} + \underbrace{(1-\gamma)\sum_m b_m I_m}_{\text{expected pledgeable assets}} \geq \underbrace{(1+r)\big(V(1+\Psi) - E\big)}_{\text{loan + net cost of ext. financing}} \tag{11}$$

This formulation highlights the dual role of monitoring: mitigating incentive problems (the bank as a "watchman") and boosting pledgeable resources (the bank as a "collateral expert").

Substitution Effect The influence of a bank extends beyond the boost of the firm's pledgeable income. Consider the expression for a firm's optimal price in market m:

$$p_m = \frac{\tau_m}{\varepsilon\gamma\varphi} \overbrace{\left[(1+r)(1+\Psi) + \frac{\lambda}{1+\lambda}(1-b_m) - (1-\gamma)b_m\right]}^{\delta_m > 0} \tag{12}$$

where $\lambda \geq 0$ is the Lagrangian multiplier from the incentive constraint (10), τ_m is the iceberg trade cost from Home to market $m \in \{d, x\}$, and $\varepsilon = \frac{\sigma-1}{\sigma}$. In a friction-free environment, a firm prices at a constant markup over marginal cost; firms with higher productivity φ have a lower marginal cost and, hence, are more competitive. Financial frictions create a wedge between marginal revenue and marginal cost: the term with λ is the "hazard premium" per unit of output that must be earned to ensure that the firm's claim on production returns is incentive compatible.

The term δ_m captures the effect of financial factors on a firm's activities in market m. Financial development in the firm's locale will determine the wedge between marginal revenue and marginal cost. In fact, changes in β_m (holding $\beta_{\neg m}$ constant) alter the return in market m relative to market $\neg m$ through the equilibrium monitoring b_m. For firms with a binding incentive compatibility constraint (credit-rationed firms), monitoring affects the premium with λ; for all firms, it also affects the financing cost through the collateral liquidation value upon default (see the last term in square parentheses in (12)).

Clearly, bank monitoring in market m and the production scale in market m are complements, while monitoring in market m and production in $\neg m$ are substitutes. Thus, improvements in market-m monitoring due to changes in β_m may induce a firm to substitute financing from market $\neg m$ to market m.

Competition Effect For simplicity, consider the expression for the industry price in a closed economy. Let $\theta \in \mathbb{R}^k_+$ be a random vector of firm and local financial parameters; $F(\cdot)$ be the cumulative distribution function for θ; Θ_m be the set of firms active in market m; M be the mass of active firms; finally, let $\mu_m = \varphi/\delta_m$. In the following, we will refer to μ_m as the effective productivity of a firm in market m. We can express the industry price $\mathbb{P}$ as a function of the firm entry mass and average effective productivity:

$$\begin{aligned} \mathbb{P} = M^{\frac{1}{1-\sigma}} \left[\int_{\Theta_e} p_d^{1-\sigma} dF_e(\theta) + \frac{\Pr(\mathrm{x})}{\Pr(\mathrm{e})} \int_{\Theta_x} p_x^{1-\sigma} dF_x(\theta) \right]^{\frac{1}{1-\sigma}} = \frac{M^{\frac{1}{1-\sigma}}}{\varepsilon \tilde{\mu}}, \\ \text{where} \quad \tilde{\mu} = \left[\int_{\Theta_e} \left(\frac{\gamma\varphi}{\delta_d} \right)^{\sigma-1} dF_e(\theta) + \frac{\Pr(\mathrm{x})}{\Pr(\mathrm{e})} \int_{\Theta_x} \left(\frac{\gamma\varphi}{\tau_x \delta_x} \right)^{\sigma-1} dF_x(\theta) \right]^{\frac{1}{\sigma-1}} \end{aligned} \tag{13}$$

is a power mean of a firm's productivity after accounting for financial factors. Expressing the industry price in this way clarifies the implications of financial development for competitiveness. A domestic financial deepening increases $\tilde{\mu}_d$, primarily through reductions in δ_d. For firms that are sufficiently credit-rationed, the increase in credit access outweighs the fiercer competition due to the reduction in the industry price $\mathbb{P}$, and sales tend to increase. For firms that already enjoyed easy credit access, the financial deepening causes their competitiveness to deteriorate as $\mathbb{P}$ falls; hence, their sales tend to drop.

It is also worth underscoring that, while a locally specialized financial shock affects all firms, a non-localistic shock is only felt by exporters, who generally have higher productivity in our economy. Therefore, the likelihood of deriving benefits from a non-localistic shock is correlated with variables that drove a firm's pre-shock success.

3.3.2 Aggregate Effects

The change in aggregate exports ΔX induced by a shock equals $\Delta X = \Delta p_{xt}(M_{et}\mathbb{E}_{xt}[R_x])$, where p_x is the probability of entering export, M_e is the entry mass of would-be firms, and $\mathbb{E}_{xt}[R_x]$ is the expectation of foreign sales revenues over the distribution of firms for which export entry is optimal. Here, $t = 0$ and $t = 1$ refer to the pre- and post-shock equilibrium, respectively. To study the effects of shocks on the intensive and extensive trade margins, it is convenient to distinguish between incumbent (or continuing) exporters, which export both before and after the shock, and those whose export participation depends on the realization of the shock:

$$\Delta X = \overbrace{\Delta(\mathbb{E}_{Ct}[R_x]M_{et})}^{\text{continuing exp. change}} + \overbrace{\Delta(p_{At}\mathbb{E}_{At}[R_x]M_{et})}^{\text{net entrant change}}. \tag{14}$$

The subscript C refers to continuing exporters; At refers to firms that export only in equilibrium t.[17]

We define changes to the intensive margin as the aggregate difference in the foreign sales of incumbent exporters. Changes to the extensive margin come through changes in the firm entry mass M_e (market size) and in the distribution of exporters (distribution shift). By carefully adding zero, for sufficiently small changes (14) becomes[18]

$$\Delta X \approx \underbrace{p_C M_{e1}\Delta(\mathbb{E}_C[R_{xt}])}_{\text{intensive margin}} + \underbrace{p_C\mathbb{E}_C[R_{x0}]\Delta(M_{et})}_{\substack{\text{extensive margin:}\\ \text{market size}}} + \underbrace{M_{e1}\Delta(p_{At}\mathbb{E}_{At}[R_{xt}])}_{\substack{\text{extensive margin:}\\ \text{distribution shift}}}. \tag{15}$$

4 Model Calibration

We calibrate the model to the Italian firm and local banking markets data (Table 1). To this end, we generate an industry of simulated firms, construct moments using the simulated data, and then match them to moments of the Italian data (Table 2). First, we describe the stochastic structure of the model; next, we outline the moment matching algorithm (see also Appendix E).

Stochastic Structure A firm is characterized by the vector θ, which includes the firm's productivity (φ), wealth endowment (W), and fixed costs for the domestic and export markets (F_d, F_x). We augment θ with the market-specific bank monitoring cost parameters β_m to capture the contribution of heterogeneity in bank specialization. Sources of variation are at the firm level

17. Note that the probability of being an incumbent exporter both pre- and post- shock does not change between equilibria by construction.

18. One could be concerned that a different choice of zero could yield a qualitatively similar decomposition with quantitatively different results. However, there is little to be concerned for small enough shocks, as shown in Appendix D.

and the province level. The former comprise productivity, wealth endowment, and fixed costs; the latter comprise the probability of technological failure and the bank monitoring cost parameters.

For simplicity, we assume that a single source of randomness in fixed costs may be used to construct fixed-cost draws for the domestic and export markets. With this in mind, we posit that the marginal distributions for firm productivity, initial wealth endowment, and fixed cost draw are all distributed exponential but have a joint multivariate distribution. We further assume that the copula describing the joint probability of a particular 3x1 draw is Gaussian. The pairwise correlations of these three random variables are parameters used to match moments.

We construct an exogenous technological shock variable using data on the provincial dynamics of manufacturing firms from the Italian Union of Chambers of Commerce, Industry, Crafts, and Agriculture. Specifically, we define a firm's probability of technological failure as the number of provincial manufacturing firm exits in 1997 divided by the number of manufacturing firms registered in the province in 1997. As to the final source of province-level variation, we use the aforementioned data from the Bank of Italy on the composition and depth of a province's banking sector to construct bank monitoring cost parameters. Specifically, we assume that:

$$\beta_{mp} = \left[\alpha_m * \frac{\#\text{ of type } m \text{ bank branches in province } p}{\text{thousands of persons in province } p}\right]^{-1} \tag{16}$$

where $m \in \{d, x\}$ corresponds to locally specialized and non-localistic bank branches, respectively. This assumption accomplishes two ends: (i) it creates spatial variation in "local" financial access; and (ii) it functionally reduces the model dimensionality.[19]

We obtain three parameter values from external sources. The industry and goods demand elasticities are from Costantini and Melitz (2009) and the real interest rate is constructed using data on deposit rates and inflation from the Bank of Italy. The remaining parameter values are obtained through the moment-matching procedure.

19. We would otherwise need to calibrate monitoring cost parameters for each province.

Convergence to the Equilibrium Given some candidate parameter vector θ, we initialize the algorithm by providing guesses $(M_e^0, \mathbb{P}_0)$ for the mass of entrants and the industry price; then, we simulate the profit-maximization programs of an industry of simulated firms. Given the simulated firm best responses to these guesses, we construct a sequence of fixed-point iterates $\{M_e^k, \mathbb{P}_k\}_{k=0}$ that define our next guesses:

$$\begin{aligned} M_{e,k+1} &= M_{e,k}\left(1 + \zeta * \frac{F(\theta \in \Theta_d)\mathbb{E}[\pi(\mathbb{P}_k, M_{e,k})|\theta \in \Theta_d]}{F_e}\right) \\ \mathbb{P}_{k+1} &= M_{e,k+1}^{\frac{1}{1-\sigma}}\left[\sum_m \{\Pr_k(q_m > 0)\int_{\Theta_{m,k}} p_{m,k}(\theta)^{1-\sigma} dF_{m,k}(\theta)\}\right]^{\frac{1}{1-\sigma}} \end{aligned} \tag{17}$$

The process is repeated until the distance between successive $(M_e^k, \mathbb{P}_k)$ satisfies a convergence criterion. Since we use the newly generated iterate for M_e^{k+1} to generate our new iterate for $\mathbb{P}_{k+1}$ (a generalization of the Gauss-Seidel algorithm), we employ the dampening term $\zeta \in (0,1)$ when generating M_e^{k+1} to improve algorithm stability.[20]

The Main Channels We review up front the mechanisms that will shape our results. Recall the optimal price charged for output destined for market m:

$$p_m(\mu_m) = \frac{\tau_m}{\gamma\varepsilon\varphi}\left[(1+r)(1+\overbrace{\Psi}^{\sum_m \psi_m(b_m)}) - (1-\gamma)b_m + \overbrace{\frac{\lambda}{1+\lambda}(1-b_m)}^{\text{hazard premium}}\right]. \tag{18}$$

Substitution Effect: Increased access to bank monitoring specialized in market m induces a firm to increase scale in market m. Increases in market-m scale beget increased m-type monitoring and decreased $\neg m$-type monitoring. These changes lead to further shifts of production towards market m and away from market $\neg m$.

Pledgeable Income Effect: Increased access to bank monitoring of either type increases the firm's pledgeable income in all markets. This manifests itself through (i) a reduction in the firm's hazard premium and (ii) a general reduction in the cost of financing, i.e., the direct effects

20. See Judd (1998). For our purposes, $\zeta = 0.6$.

of the reduction of the magnitude of α_m on price in either market. These effects induce increased investment in all the markets in which the firm is active. The more the firm lacks for pledgeable income (the higher λ is), the more this effect gains strength relative to the substitution effect.

Competition Effect: The above effects induce changes in market structure. Increases in credit access shift the supply of the industry outward, driving down the industry price. Denoting variables from the post-shock equilibrium with hats, the ratio of post-shock market-m revenue to pre-shock market-m revenue can be expressed as[21]:

$$\frac{\hat{r}_m(\hat{\mu}_m)}{r_m(\mu_m)} = \left(\frac{M_m}{\hat{M}_m}\right)^{\frac{\sigma-\eta}{\sigma-1}} \left(\frac{\tilde{\mu}_m}{\hat{\tilde{\mu}}_m}\right)^{\sigma-\eta} \left(\frac{\hat{\delta}_m}{\delta_m}\right)^{\sigma-1} \tag{19}$$

from which, denoting with g_x the percentage growth in variable x,

$$g_r^m \approx -(\sigma-1)g_\delta^m - \left(\frac{\sigma-\eta}{\sigma-1}\right)g_M^m - (\sigma-\eta)g_\mu^m. \tag{20}$$

For a firm's revenue to grow ($g_r^m > 0$), it must be that the shock improves its price position relative to the industry. Loosely speaking, this requires that its gains (losses) in financial access (g_δ^m) outweigh the market increases (reductions) in size (g_M^m) and average effective productivity (g_μ^m). Thus, a financial deepening benefits firms whose financial access is poor and harms firms whose financial access is already strong.

5 Model Analysis

We investigate the responses to different types of financial development. We perform counterfactuals by increasing the branch density of banks of a particular type by 1%. Recall, in fact, that branch density of the locally specialized and non-locally specialized banks indexes the monitoring efficiency parameter and is the source of financial heterogeneity. Financial development

21. This expression uses the price in (17). M_m is the mass of firms active in market m; δ_m is a firm's relative access to finance; μ_m is effective market-m productivity; and $\tilde{\mu}_m$ is its industry average.

prompted by changes in financial regulation is typically associated with changes in bank branch presence significantly larger than 1% (World Bank 2019). In Section 6, we will then examine the effects of significantly larger shocks, of magnitude comparable to the 1990s Italian deregulation.

For our purposes, entrepreneurs have five relevant states: inactive; domestic-only, credit-rationed; domestic-only, credit-satiated; exporter, credit-rationed; exporter, credit-satiated. Thus, we organize the results in a transition matrix, where the x-axis and y-axis separate firms by their state before and after the shock, respectively.

5.1 Effects of Financial Development

We first investigate the effects of a 1% increase in locally specialized banking density (LBD). In addition to studying the effects on foreign, domestic and total sales, to gain insights into welfare we also refer to total output inclusive of liquidation values.

5.1.1 Locally Specialized Development

As Table 3, column 1, shows, a 1% increase in the density of locally specialized banks reduces exports by 2.32 basis points. That is, in aggregate, locally specialized financial development depresses, rather than promotes, trade. As discussed below, the intensive margin effects are especially responsible for this overall negative impact. On the other end, on the extensive margin, locally specialized financial development boosts export participation.

Table 4 shows the changes in average and total sales for each firm transition class. The diagonals on tables in this section provide the changes in sales for firms whose export and credit rationing status remains unchanged after the shock, that is, the intensive margin effects. Figure 2 decomposes the change in aggregate foreign sales (reported again in Panel D) into the intensive margin (Panel A) and extensive margin (Panels B and C).

Intensive Trade Margin Panel A in Figure 2 shows that, relative to the pre-shock equilibrium, the aggregate foreign sales of incumbent exporters (firms that export both before and after the shock) drop by 1.24 basis points.

Since access to locally specialized banks improves monitoring efficiency for the Home market, the substitution effect tends to decrease foreign sales. In fact, incumbent exporters that are credit-satiated before and after the shock reduce foreign sales by 1.49 basis points. Intuitively, while the financial deepening increases pledgeable income for all firms, credit-satiated firms are not constrained by pledgeable income by definition. As such, there is no pledgeable income effect for them. These dynamics can also be seen in Figure 3(a). The credit-satiated exporters comprise the lighter blue region at the bottom left of the plot. Since they had sufficient financial access to be credit-satiated in the pre-shock equilibrium, increases in financial access cannot improve their relative export market performance. Thus, their exports decline.

Incumbent exporters that are credit-rationed both before and after the shock increase foreign sales by a more modest 0.25 basis points (see also the upper-right of Figure 3(a)). Credit-rationed exporters can use the improved pledgeability of their domestic inventory assets to underwrite increased investment in foreign sales. The pledgeable income effect "bites" here, slightly dominating the substitution and competition effects.[22]

Extensive Trade Margin Recall the free-entry equilibrium condition:

$$\begin{aligned} f_e =& \Pr(\text{e}) \int_{\Theta_e} \pi(\mathbb{P}, \theta) dF(\theta) = \Pr(\text{e}) \int_{\Theta_e} \pi\big(M_e^{\frac{1}{1-\sigma}} p(\tilde{\mu}), \theta\big) dF_e(\theta) \\ f_e =& \Pr(\text{e}) \int_{\Theta_e} \pi_d\big(M_e^{\frac{1}{1-\sigma}} p(\tilde{\mu}), \theta\big) dF_e(\theta) + \Pr(\text{x}) \int_{\Theta_x} \pi_x\big(M_e^{\frac{1}{1-\sigma}} p(\tilde{\mu}), \theta\big) dF_x(\theta), \end{aligned} \tag{21}$$

22. The off-diagonals of the top table in Figure 2 refer to firms whose rationing status changes while remaining an exporter. The exporters that lose rationing status are generally more productive than those that become rationed. Localistic bank deepenings enable all firms to compete more fiercely. For less productive firms with better credit access before the shock, this adversely affects their market position.

where Pr(e) (respectively, Pr(x)) is the probability of producing for the domestic (foreign) market. Changes in the extensive trade margin are driven by changes in entrants' mass M_e and in exporters' relative measure Pr(x) and distribution $F_x(\theta)$ (see Panels B and C in Figure 2).

Distribution An improved access to locally specialized banks boosts the pledgeability of domestic inventories. This enables increased investment in all markets where investment is feasible while increasing the attractiveness of domestic production relative to export, shifting the boundaries of the set of active exporters. For most firms affected by this shift, the pledgeable income effect dominates and enables them to reach market scales that make entry into export optimal. For a much smaller number of firms, the substitution effect dominates. These exiting exporters typically have higher domestic fixed costs than entering exporters and even higher export fixed costs. For them, it is profitable to switch to domestic-only production to reap the full benefit of the reduced monitoring costs. Overall, the probability of export participation rises by 0.77 basis points; new exporters account for a 0.49 basis point increase in aggregate foreign sales (Figure 2, Panel B).

Mass of Entrants The combination of increased entry and increased effective productivity $\tilde{\mu}$ generates a significant drop in the industry price $\mathbb{P}$ - so large, in fact, that it drives expected profits conditional on entry below the entry cost. To satisfy the free entry condition, the firm entry mass must decrease slightly, causing aggregate trade to drop by -1.56 basis points (Figure 2, Panel C). Thus, locally specialized banking development has two countervailing effects on the extensive margin of trade. It makes export profitable for a broader measure of firms (distributional effect). However, by facilitating competition and eroding profits, it dampens entry pressure through reductions in the entry mass.

5.1.2 Domestic Sales and Output

While depressing aggregate exports, locally specialized financial development boosts aggregate domestic sales (see again column 1 of Table 3). Overall, it also increases total sales and total output inclusive of the liquidation values of inventories.

Since locally specialized monitoring supports domestic activity, the substitution effect tends to boost domestic sales. We again start with the intensive margin (see the diagonal of the upper-right submatrix of Panel B in Table 4): the sales of rationed domestic-only firms exhibit the strongest increase, followed by those of rationed exporters. For these firms there is a positive pledgeable income effect, though for rationed exporters it is diffused across the domestic and foreign markets. The substitution effect alone is insufficient to increase domestic sales for credit-satiated firms. As they could already satisfy credit needs, their effective productivity gains are outpaced by those of rationed firms. Since their pre-shock position was partly due to superior financial access, their domestic performance declines.

Keeping this in mind, the upper-right submatrix of Panel B of Table 4 shows the impact of a locally specialized financial deepening on the aggregate domestic sales of each firm transition class. Although the financial deepening reduces domestic sales for those domestic-only firms that enter export or exit production activities altogether, these effects are dominated by the increase in domestic sales due to firms entering production and the boost to the domestic sales of credit rationed exporters and domestic-only firms.

5.1.3 When Financial Development Fosters Trade, besides Output

The effects of non-localistic banking development (NBD) differ sharply from those of locally specialized development. In interpreting them, one should recall that we are in a symmetric, two-country world. For example, we can think of a regulatory shock that allows a bank like

Santander or Unicredit to open branches in both Italy and Germany. The 1990s deregulation included such a shock, as EU members adopted the principle of mutual recognition of the foreign bank branches of other members. In any case, it is important to remember that Foreign's exporters are affected as well.

We find that overall a 1% increase in non-localistic banking density induces a 6.14 basis point boost to aggregate exports (column 2 of Table 3) and a 0.68 basis point increase in total output. As shown in the bottom-left of Panel A in Table 4, average foreign sales rise for both credit-satiated and credit-rationed exporters. For these exporters the substitution effect now favors export. In addition, the pledgeable income effect further increases the foreign sales of credit-rationed exporters.

There are two critical differences from locally specialized financial development: first, the substitution effect now encourages export; second, to realize the direct benefits of the shock, one must be an exporter or an inframarginal exporter. While locally specialized financial deepenings increase financial access for any firm, non-localistic deepenings increase financial access for those firms that are already more productive and profitable. A locally specialized deepening makes it easier for smaller/weaker/less productive firms to compete with larger/stronger/more productive firms; it mitigates inter-firm inequalities. By contrast, a non-localistic deepening widens inter-firm inequalities.

5.1.4 Export Dispersion, Democratization, and Fragmentation

The difference between the changes induced by a locally specialized financial deepening and a non-localistic deepening is stark. Panel B of Table 4 shows how financial deepenings change the distribution of active firms; Table 5 summarizes how they affect the extensive and intensive margins of production for the domestic market and the export market. A locally specialized deepening broadens the distribution of active firms (democratization of export); a non-localistic deepening narrows it. A locally specialized deepening, on the other hand, also precipitates a fragmentation of export production: it eases the entry of less productive firms through the pledgeable income effect while inducing scale reductions by incumbent exporters through the substitution effect, decreasing the mean exports conditional on export participation. Further, it induces reductions in average firm sales. As a result of these effects, overall a locally specialized deepening shrinks aggregate trade, in contrast with a non-localistic deepening which boosts aggregate trade.

These differences are important for policy making. Locally specialized financial development eases export participation, mitigates inter-firm inequality but discourages total export growth. In contrast, non-localistic development increases aggregate exports, but shrinks industry participation and exacerbates inter-firm inequalities.

5.2 From Model to Data: the 1990s Banking Deregulation

Methodology We verify the consistency of the model's key predictions with the effects of the 1990s Italian bank deregulation on firms' extensive and intensive export margins. To this end, we exploit the firm and provincial banking markets data detailed in Section 2 (see again the data summary in Appendix Tables A1 and A2).

Our strategy is to identify exogenous, deregulation-driven shocks to banking development in local (provincial) markets, differentiating between the deepenings in the presence of locally specialized banks and of banks with national and international scope. The probability that firm i exports (extensive margin of export) can be written as:

$$\mathrm{P}(Export_i = 1 | B_i, Z_i) = \Phi\left(\alpha_1 + B_i\beta_1 + Z_i\gamma_1 + \varepsilon_{1i}\right), \tag{22}$$

where $\Phi(\cdot)$ is the standard normal cdf, B_i is the measure, or vector of measures, of banking development during the deregulation period in the province where firm i is located; Z_i is a rich vector of controls for factors that may affect export, including firm and province characteristics, as well as area, industry, and export destination fixed effects; and ε_{1i} is the error term. As noted, as deregulation-driven measures of banking development, we consider the annual percentage change of the branches of locally specialized (cooperative, popular, and savings) banks and the annual percentage change of all bank branches in the province in the period 1991-97.[23]

We instead use the following specification to study the intensive margin of trade:

$$y_i = \alpha_2 + B_i\beta_2 + Z_i\gamma_2 + \varepsilon_{2i}, \tag{23}$$

where y_i is the firm i's value of exports over total sales and ε_{2i} is the error term. All the independent variables are the same as in equation (22). We estimate the regressions in (22) and (23) for the full sample of firms and then, in additional tests, separately for the firms that declare to rely on banks headquartered in their province and for the firms that instead rely on banks headquartered outside the province.

One might be concerned about reverse causation. We have no reason to believe that shocks to the local supply of banking services, due to the deregulation, are driven by firms' export. In addition, we include a rich set of controls and fixed effects. However, it remains possible that unobserved factors simultaneously affect financial development and export. We adopt two strategies to assuage this possible concern. First, we follow the approach proposed by Rajan and Zingales (1998) and adopted by Manova (2013) for exports: we test whether the impact of banking development differs across firms with different external financial dependence due to technological reasons. As stressed by Manova (2013), in certain sectors firms need more external funds and have to sustain higher upfront costs for reasons only related to the production process. Being driven by technological factors, financial dependence is unlikely to be endogenous to the

23. Most of the expansion of bank branches occurred in the provinces where banks had already a presence (about 95% of the banks did not increase the number of provinces in which they operated).

financial frictions faced by firms. As a proxy we use the measure from Rajan and Zingales (1998), who consider U.S. Compustat firms and capture sectoral financial dependence through the share of production costs not financed by cash flow. Second, we complement the OLS and Probit estimates with an instrumental variable (IV) approach. Let I_p be a vector of instruments correlated with local banking development but that affect export only through the banking channel. Their effect on B_i is captured by β_4 in the banking development equation:

$$B_i = \beta_3 Z_i + \beta_4 I_i + \varepsilon_{3i}, \tag{24}$$

where Z_i denotes the controls, I_i denotes the instruments, and ε_{3i} is the error term.

To identify instruments, we exploit the aforementioned 1936 banking law, which subjected the banking system to strict entry regulation until the 1990s. Guiso et al. (2004, 2006) demonstrate that the regulation deeply affected the creation and location of bank branches in the decades post 1936. Thus, we expect that it shaped the local banking structure in those decades and that this affected the creation of bank branches following the deregulation. Put differently, we expect the local tightness of the 1936 regulation to be correlated with our measures of local banking development in the 1990s. On the other hand, as shown by Guiso et al. (2004, 2006), the distribution of types of banks across provinces in 1936 and, therefore, the tightness of the regulation in a province did not reflect market forces but was the result of a "historical accident", namely, the interaction between previous waves of bank creation and the history of Italian unification. Moreover, the regulation was not designed with the needs of the provinces in mind: the differences in restrictions on the various bank types were related to differences in banks' connections with the Fascist regime. Therefore, the regulation is unlikely to have had any direct impact on export in the 1990s.

We choose as instruments the indicators that Guiso et al. (2004) employ to characterize the local banking structure in 1936 and, hence, the local tightness of the regulation (recall that the regulation affected provinces differently according to their banking structure).[24] The instruments comprise: provincial bank branches per capita, provincial local bank branches per capita, mutual bank branches per capita, and savings bank branches per capita, all calculated in 1936 and per 100,000 inhabitants.

In the regressions, we include a broad range of firm-level and province-level controls, and detailed sets of fixed effects. To control for the initial level of banking development, we use provincial data on the number of bank branches in 1991 (per 1,000 inhabitants). To account for the fact that older, larger, and capital intensive firms are more likely to export (Bernard and Jensen 2004), we include firm size (number of employees), age, and capital intensity (log of fixed assets per worker). We also include dummies indicating whether a firm is a corporation and whether it belongs to a consortium. Moreover, we include two-digit ATECO industry fixed effects to account for other sources of comparative advantage and for the pattern of global demand. We further insert geographical area fixed effects indicating whether a firm is headquartered in the South or Center (the main areas of Italy differ in infrastructures). Area dummies are also useful because the north of Italy is closer to the EU markets where Italian firms mostly export. In additional tests, we also include broad export destination area fixed effects[25] and a provincial measure of banking concentration (the average Herfindahl-Hirschman index of bank branches during the period 1991-97).[26]

Estimates Table 6, Panel A, shows the estimated effects of (the types of) financial development on export. Columns 1-3 suggest that overall financial development (an increase in the presence of all banks in a province) promotes export participation (extensive margin). In column

24. For example, as noted, savings banks were less constrained by the 1936 regulation.

25. Information on destinations is not fully comprehensive, as firms indicate only the top three destination areas. Thus, we omit destination area fixed effects in the baseline regressions.

26. This can also help capture the possible effect of bank mergers in those years.

4, where we insert granular measures of financial development and their interactions with financial dependence, a more nuanced pattern emerges: consistent with the model, in sectors with higher financial dependence, the increase in export participation is primarily driven by locally specialized banks.

Next, we examine the intensive margin effects. Column 6 of Panel A points to a positive effect of overall financial development on a firm's export intensity. However, in line with the model, this effect is significantly smaller when branch growth is driven by banks with local specialization (column 8). Column 9 includes both financial development measures and their interactions with financial dependence. The estimates confirm the negative impact of locally specialized financial development on export intensity, suggesting that this is driven by firms that are less vulnerable to financial constraints (i.e., with lower financial dependence).[27] Column 9 also confirms a positive impact of overall financial development on export intensity. The IV estimates in column 10, which are obtained instrumenting the measures of financial development with the 1936 indicators of tightness of bank regulation[28], confirm the insights of column 9.[29]

In Panel B of Table 6, and in Appendix Table A3, we subsample firms according to two proxies for financial tensions: firms' leverage ratio and a credit rationing indicator provided by the Mediocredito survey.[30] The negative effect of the deepening of locally specialized banks on the intensive export margin detected in Panel A appears again to be driven by firms that are less subject to financial tensions or constraints (with lower leverage - Panel B of Table 6, column 2 - and not exposed to bank rationing - Panel B, column 4).

27. The estimates are not driven by any single category of locally specialized banks in particular.

28. In the first stage we also include the instruments interacted with financial dependence. Their coefficients have the expected signs. For example, provinces with more savings banks in 1936, hence less constrictive regulation, experience a smaller increase in total bank branches during the deregulation. Across the first-stage regressions, the significance levels and the tests for weak instruments suggest that we do not face an issue of weak instruments.

29. We do not elaborate on the size of the effects in Table 6. Exploiting sectoral financial dependence ameliorates endogeneity issues but does not lend itself to an interpretation of the size of the effects.

30. The survey asks the firms whether they were exposed to credit rationing by banks.

In Panel C of Table 6, columns 5-6, we subsample firms according to their reliance on banks headquartered in the firm's local territory (province). To this end, we exploit a unique question in the Mediocredito survey which asks firms whether they traditionally rely on banks that have their headquarter in the province. In addition, we make two further restrictions: we focus on firms located in provinces in which no bank with national or international scope is headquartered (Panel C, column 7); and we restrict attention to firms whose reliance on locally headquartered banks dates back to prior the start of the deregulation period (Panel C, column 9).[31] We find that the detected negative effect of the growth of locally specialized banks on the intensive margin of export occurs for the firms that traditionally rely on locally headquartered banks, which are plausibly the firms most sensitive to the growth of locally focused banks. In contrast, this negative effect fades away for firms that traditionally rely on banks headquartered outside their province.

In summary, consistent with the model, the estimates indicate that locally specialized financial development boosts export participation but may depress the intensive export margin of firms less exposed to financial frictions and more reliant on locally focused banks. Non-localistic financial development instead appears to especially promote the intensive export margin.

We perform several robustness tests. In Table 7, columns 2-5, we add destination fixed effects to the baseline regressions, while in Appendix Table A4 we add the Herfindahl of branches.[32] In Table 7, column 6, we exploit the panel of firms surveyed in 1995-1997 and in 1998-2000. Since export sales are missing in 1998-2000, we focus on the extensive margin. As measures of banking development, we consider the annual percentage changes of locally specialized branches and of all branches in 1991-97 and 1994-2000. The panel allows for the inclusion of time (survey wave) and province fixed effects. The results carry through.

31. This can assuage possible concerns about the endogeneity of firms' reliance measure.

32. In Table 7, column 1, in the intensive margin we replace exports to sales with (log)exports.

Finally, since our data are representative of firms with 10 or more employees, one may wonder whether the results hold for the universe of manufacturers. In Appendix B, we perform regressions that explain province-level manufacturing exports and manufacturing firm entry as a function of our banking development variables and other covariates. Increases in the density of locally specialized branches are associated with persistent decreases in provincial exporting intensity, even when saturating the regression with province fixed effects and province-specific trends.

6 Financial and Trade Policy Counterfactuals

In what follows, we perform counterfactual experiments in the model to study the economic significance of the effects in aggregate and over the firm size distribution. First, we "re-regulate" the banking sector by reversing the growth in branch densities occurred from 1990 to 1997 to evaluate the contribution of the deregulation-driven banking development to trade and production. Second, we simulate a reduction in variable trade costs to compare the effects of trade liberalizations and financial liberalizations. When studying trade liberalization, we also consider joint trade and financial liberalization shocks.

6.1 Quantifying the Effects of Banking (Re-)Regulation

To assess the contribution of banking development to trade and other aggregate outcomes, we conduct counterfactuals in which we "reverse" the Italian financial development to pre-deregulation (1990) levels. Reversing the banking development occurred from 1990 to 1997 requires localistic and non-localistic bank branch count reductions of 28.6% and 42.9%.[33] Given that we obtain our benchmark simulation calibrating the model to 1997 data, these experiments

33. To deliver a consistent change across geography, we apply such reductions to all provinces.

can be interpreted as changes from the 1997 benchmark.

Since the mechanisms are as in Section 5, we relegate a detailed discussion to Appendix D (clearly, since we consider a re-regulation, the signs of the effects are reversed). As shown in Table 3, columns 3-4, the LBD reversal increases aggregate exports by about 0.7%, while the NBD reversal reduces them by 3.4%.[34] Column 5 of Table 3 also displays the effects of a joint reversal of locally specialized and non-localistic banking development (TBD shock). The effects are roughly equal to the sum of the LBD and NBD reversals.

6.2 Financial and Trade Liberalizations

We next compare the impact of financial development with that of trade liberalization (see Table 8). To this end, we conduct a counterfactual in which we reduce the net iceberg trade cost $(\tau - 1)$ by 1% (NTC, Table 8, column 1). Columns 2-3 of Table 8 re-present the summary statistics of the financial development experiments of Section 5 (Table 3, columns 1-2) as a percentage of those from the 1% trade barrier reduction.

Aggregate Effects Column 3 of Table 8 reveals that the responses of non-financial variables to a 1% increase in non-localistic banking density have the same sign as the trade cost shock responses and are generally within an order of magnitude of those responses. The effects on domestic and foreign sales are 12.3% and 11.7% of their corresponding trade-barrier-reduction effects. And the effects on total sales and output are 8.7% and 9.2% of their trade-barrier counterparts. The change in the probability of being an exporter is 17.0% of its trade-barrier counterpart.

The rescaled responses to the locally specialized financial shock in column 2 of Table 8 exhibit significantly more variation in their sign and magnitude than their non-localistic counterparts,

34. The LBD reversal decreases total output by 0.5%, while the NBD reversal reduces it by 0.4%.

reflecting the mechanisms uncovered in Section 5. The effects on domestic and foreign sales represent -8.6% and -4.4% of the trade barrier shock responses, respectively; those on total sales and output are 19.3% and 18.9%, respectively. The change in the probability of exporting is 3.4% of its trade shock counterpart.

Therefore, 1% shocks to banking densities induce responses that are roughly within one order of magnitude in absolute value of their trade shock analogues. Consistent with this, column 5 of Table 8 shows that a 10% increase to non-localistic banking density generates -18.2 and 51.9 basis point changes to domestic and foreign sales, respectively, close to the -17.7 and 52.2 changes induced by the trade shock. Similar magnitudes are observed for a 10% shock to locally specialized density (column 4). We recall here that between 1990 and 1997 the Italian financial liberalization triggered an increase of non-localistic bank branches by approximately 75% and an increase of locally specialized bank branches by roughly 43%.

Some countries enact trade and financial liberalizations at the same time. To understand how such liberalizations can interact, we next simultaneously reduce the trade cost by 1% and increase both locally specialized and non-localistic banking density by 1%. A deepening in the presence of all banks (TBD shock) magnifies the response to trade liberalization (Table 8, column 6). For example, total output rises by 9.0 basis points, while it rises by 6.9 basis points after a trade-only shock. Increased responsiveness to trade liberalization is driven by expanded financial capacity: credit rises by 6.3 basis points compared to 3.5 basis points after the trade-only shock.

Effects over the Firm Distribution Figure 1 plots changes in foreign and domestic sales over firm size (we consider 10% financial shocks to ease comparisons with the trade shock). Trade and financial liberalizations can have very different consequences for export participation and for the fragmentation of the export sector.

Consider first the plot for the response of foreign sales to the trade shock (reduction in the net iceberg trade cost by 1%). In a Melitz (2003) model with no financial frictions, exports are decreasing in τ; further, the export response to changes in τ is increasing in firm size.[35] In keeping with the fact that the left tail of the size distribution has a greater proportion of firms with poor financial access, in our economy there is instead a segment of the distribution over which the response to the drop in the trade cost is decreasing in size. Export dispersion - as measured by the standard deviation of foreign sales across firms - increases by 0.35%.

The plot of the responses of foreign sales to the non-localistic financial shock largely coincides with that of the trade shock. In the left tail, the response is decreasing in firm size; however, it is far more pronounced than for the trade shock. To interpret this, recall how financial access varies with firm size. Appendix Figure A7 plots the banking density and the probability of being an exporter over the size distribution, showing that the average banking density by firm quantile is lowest as one moves toward the left tail. Therefore, the left tail disproportionately represents firms with poor financial access that strongly benefit from a bank deepening. Following the non-localistic shock to financial development, export dispersion increases by 0.30%.

The locally specialized shock also induces larger export responses in the left tail than the trade shock. However, as one moves to the right, the degree of credit rationing falls low enough for the substitution effect to dominate. Recall that locally specialized shocks improve returns to domestic production and reduce returns to export. For a subset of firms in the right tail, exiting export will become optimal, as this enables them to enjoy the improved returns to domestic production on a larger scale while avoiding the export entry cost. The shock to locally specialized financial development reduces export dispersion by 0.15%.

Finally, in Appendix D we show that for domestic sales there is a stronger similarity between

35. They are decreasing in productivity; however, size is a function of productivity in Melitz (2003).

the responses to the three shocks over the firm size distribution than for foreign sales.

7 Conclusion

Banks differ in specialization, and the specialization profile of the banking sector varies across countries and over time. This paper investigated the impact of financial development in a heterogeneous-firm model with credit frictions and heterogeneous bank specialization. The model reveals that, while financial development matters, the type of financial development itself is crucial. Increased access to banks with local specialization broadens export participation, but can reduce the export growth of incumbent exporters and, overall, shrink trade (while boosting total output). In contrast, non-locally focused finance especially raises export on the intensive margin. Further, while the expansion of locally specialized banks can moderate inter-firm inequalities driven by internationalization, non-locally focused banks exacerbate them. Using microdata from Italy, we found that these predictions are consistent with the effects of the 1990s major Italian bank deregulation. Overall, the results demonstrate that one should not abstract away from financial specialization when studying the aggregate effects of financial development.

The paper leaves open relevant questions. The environment we considered offers novel predictions about the distributional implications of trade and financial policies. Accounting for heterogeneity in the payoffs from policy changes could offer insights into their welfare effects of policies, as well as into the political economy of trade and financial policy-making. We leave these and other relevant questions to future research.

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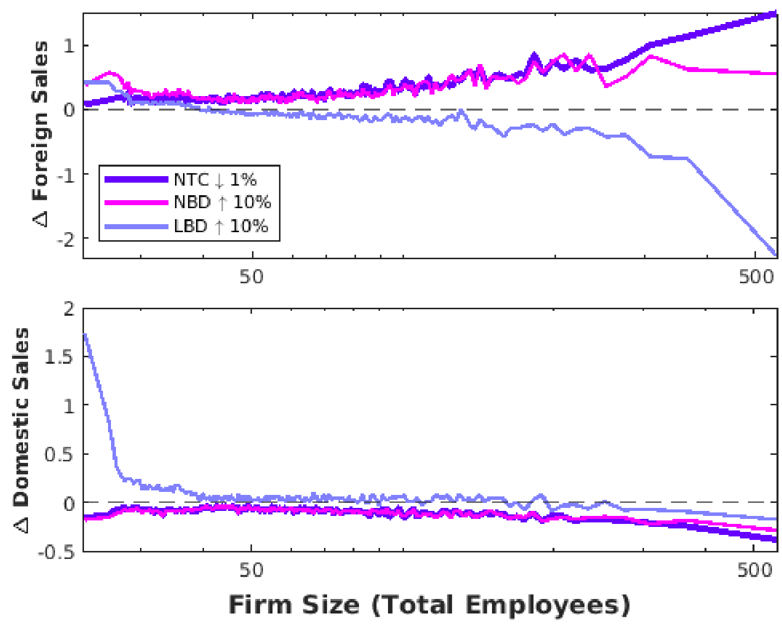
Figure 1: Financial and Trade Shocks: Changes in Export and Domestic Sales by Firm Size



The plotted data points represent half-percentiles of the size distribution. Entering/exiting firms are assigned to the firm quantile consistent with their size while active. Firm quantiles are generated from the firm size distribution prior to the realization of the shock.

Figure 2: Effects on Exports of a 1% Increase in Locally Specialized Financial Development

Panel A:
Intensive Margin: Incumbent Exporter Scale Changes

		Post		
		X|S	X|R	Tot.
Pre	X|S	-1.49		
	X|R	-ε	0.25	
	Tot.			**-1.24**

+

Panel B:
Extensive Margin: Changes to Distribution of Feasible Exporters

		Post-Shock Status					
		X|S	X|R	D|S	D|R	IA	Tot.
Pre-Shock	X|S			-0.29			
	X|R			-4.83	-0.18	-0.16	
	D|S		4.70				
	D|R		1.25				
	IA						
	Tot.						**0.49**

+

Panel C:
Extensive Margin: Firm Entry Mass Changes [36]

		Post		
		X|S	X|R	Tot.
Pre	X|S	-1.16		
	X|R	-ε	-0.40	
	Tot.			**-1.56**

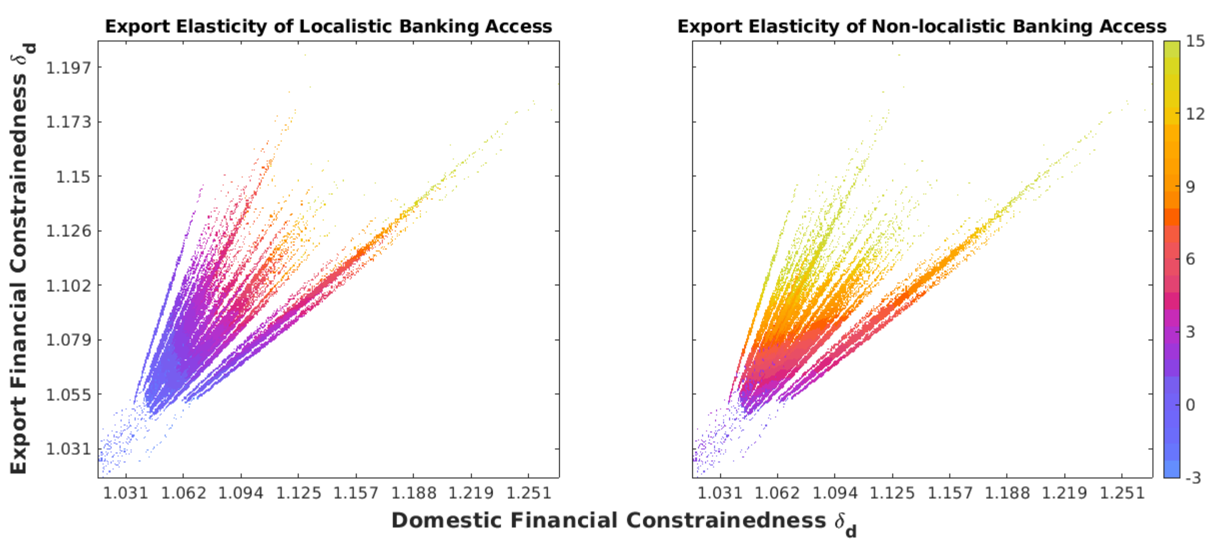
=

Panel D:
Total Change in Aggregate Exports

		Post-Shock Status					
		X|S	X|R	D|S	D|R	IA	Tot.
Pre-Shock	X|S	-2.65		-0.29			
	X|R	-ε	-0.15	-4.83	-0.18	-0.16	
	D|S		4.70				
	D|R		1.25				
	IA						
	Tot.						**-2.32**

This figure displays the change in aggregate foreign sales by firm transition class following a 1% increase in the density of locally specialized banks. Panel D refers to the total change, Panel A to the intensive margin and Panels B and C to the extensive margin.

Figure 3: Elasticity of Exports to Financial Access (Continuing Exporters)



(a) The cluster of firms near the origin represent the least-financially constrained exporters. Since they do not lack for pledgeable income, these firms only realize a substitution effect from increases in locally specialized banking access. As such, their export response is negative.

(b) When the pledgeable income effect dominates, firms invest more in all markets in which they are active; thus, domestic investment can crowd out export. As domestic financial constrainedness decreases, this crowd-out effect decays and the export response grows.

Table 1: Parameter Calibration Values

Parameter	Value	Definition
A	2520	industry demand parameter
τ	1.16	iceberg trade cost
α_{loc}	2500	locally specialized monitoring efficiency
α_{nloc}	2500	non-localistic monitoring efficiency
λ_φ	0.550	productivity exponential parameters
$\lambda_\omega, \lambda_d$	0.100	liquid asset & dom. fixed cost exponential param.
λ_x	0.700	export fixed cost exponential parameter
$\overline{\varphi}$	8.5	productivity distribution shifter
$\overline{\omega}$	0	liquid asset distribution shifter
$\overline{\kappa}_d$	2	dom. fixed cost distribution shifter
$\overline{\kappa}_x$	0.5	export fixed cost distribution shifter
$\rho_{\varphi,W}$	0.600	correlation: productivity & liquid assets
$\rho_{\kappa,\varphi}$	-0.350	correlation: fixed costs & productivity
$\rho_{\omega,\kappa}$	0.200	correlation: initial assets & total fixed costs
F_e	7.5	fixed entry cost
σ	4	consumer elasticity of substitution
η	2.5	industry price elasticity
r	2.44%	real interest rate

The table reports the calibrated values of the parameters of the model.

Table 2: Moment Matching

Moment Description	Empirical Moments	Simulated Moments
median(total sales)	68.9376	65.3900
median($\frac{\text{earnings before taxes}}{\text{total labor costs}}$)	0.0844	0.1088
$\frac{\text{total foreign sales}}{\text{total domestic sales}}$	0.4475	0.3984
fraction: domestic-only	0.4042	0.3946
fraction: domestic-only, credit-satiated	0.3417	0.2599
fraction: exporters	0.5957	0.6054
fraction: exporters, credit-satiated	0.5069	0.4382
mean: $\frac{\text{debt}}{\text{assets}}$	0.9212	0.8087
std. dev.: $\frac{\text{debt}}{\text{assets}}$	0.0893	0.1328
mean: $\frac{\text{total fixed costs}}{\text{total sales}}$	0.1172	0.1228
std. dev.: $\frac{\text{total fixed costs}}{\text{total sales}}$	0.0866	0.0534
median($\frac{\text{int. pymts.}}{\text{total sales}} \mid (X,R) = (0,0)$)	0.0410	0.0630
median($\frac{\text{int. pymts.}}{\text{total sales}} \mid (X,R) = (0,1)$)	0.0647	0.0713
median($\frac{\text{int. pymts.}}{\text{total sales}} \mid (X,R) = (1,0)$)	0.0440	0.0562
median($\frac{\text{int. pymts.}}{\text{total sales}} \mid (X,R) = (1,1)$)	0.0801	0.0664
corr(log(1+total sales),log(1+equity))	0.5835	0.6139
corr(log(1+equity),log(1+fixed costs))	0.4768	0.2096
corr(log(1+fixed costs),log(1+total sales))	0.6856	0.5423

This table reports the empirical and simulated moments of the model.

Table 3: Changes in Key Variables Induced by Financial Development Shocks

		(1)	(2)	(3)	(4)	(5)
		Benchmark Experiments		**Counterfactuals: Banking Development Reversals**		
Category	**Moments**	**LBD +1%**	**NBD +1%**	**LBD -28%**	**NBD -43%**	**Both (TBD)**
Real Aggregates	Total Sales	0.43	0.20	-0.16%	-0.12%	-0.28%
	Domestic Sales	1.53	-2.17	-0.51%	1.19%	0.74%
	Foreign Sales	-2.32	6.14	0.72%	-3.40%	-2.85%
	Mfg. Employment	1.36	0.70	-0.49%	-0.35%	-0.87%
	Active Firms	1.19	-1.10	-0.27%	0.85%	0.66%
	Dom.-Only Firms	4.23	-7.88	-1.01%	5.23%	4.55%
	Export Firms	-0.79	3.32	0.21%	-2.00%	-1.88%
Financial Provision	Total Loans	1.84	1.05	-0.69%	-0.57%	-1.30%
	Std. Dev., Loan Size	-0.20	5.36	-0.26%	-1.68%	-2.12%
	Total Int. Pymts.	1.85	1.08	-0.70%	-0.58%	-1.32%
	Std. Dev., Int. Pymts.	0.71	6.07	-0.29%	-1.70%	-2.18%
	Rationing $\mid q_x > 0$	-83.29	-58.18	28.81%	35.49%	67.30%
	Rationing $\mid q_x = 0$	-41.58	16.90	33.71%	-2.28%	31.23%
Firm Dist.	Effective Prod. $\tilde{\mu}$	0.48	0.80	-0.24%	-0.52%	-0.79%
	$\Pr(q_d > 0)$	2.75	-0.55	-0.92%	0.39%	-0.52%
	$\Pr(q_x > 0)$	0.77	3.87	-0.44%	-2.45%	-3.03%
	Avg. Size, Sales	-0.76	1.30	0.11%	-0.96%	-0.93%
	Std. Dev., Sales	-1.06	3.43	0.15%	-1.00%	-0.96%
	Avg. Size, Empl.	0.17	1.81	-0.22%	-1.20%	-1.52%
	Std. Dev., Empl.	-0.27	4.71	-0.17%	-1.44%	-1.76%

This table shows the changes in key variables induce by shocks to financial development. Benchmark experiments: *basis point* changes. Reversals: *percentage point* changes.

Table 4: Financial Development Shocks: Change in Revenues by Market and Firm Status

Panel A

			Post-Shock Status									
			Δ Avg. Foreign Revenues					**Δ Avg. Domestic Revenues**				
			X|S	**X|R**	**D|S**	**D|R**	**IA**	**X|S**	**X|R**	**D|S**	**D|R**	**IA**
Pre-Shock Status	**LBD ↑1%**	**X|S**	-0.01		-32.39			$-\varepsilon$		0.69		
		X|R	$-\varepsilon$	ε	-100.89	-139.03	-488.65	0.01	0.02	4.61	28.21	-691.09
		D|S		83.74					-4.88	$-\varepsilon$		-42.87
		D|R		59.60					-11.00	0.01	0.04	-75.48
		IA								54.17	47.93	
	NBD ↑1%	**X|S**	0.01					-0.01				
		X|R	0.01	0.02	-101.05	-56.70		$-\varepsilon$	0.01	4.78	9.84	
		D|S	32.7601	66.16				-0.86	-4.21	-0.01	-0.01	-48.26
		D|R		46.73					-9.63	-0.02	-0.01	-52.84
		IA									66.19	

Panel B

			Post-Shock Status									
			Δ Tot. Foreign Revenues					**Δ Tot. Domestic Revenues**				
			X|S	**X|R**	**D|S**	**D|R**	**IA**	**X|S**	**X|R**	**D|S**	**D|R**	**IA**
Pre-Shock Status	**LBD ↑1%**	**X|S**	-2.65		-0.29			-0.77		ε		
		X|R	$-\varepsilon$	-0.15	-4.83	-0.18	-0.16	$-\varepsilon$	0.38	0.09	0.01	-0.09
		D|S		4.70					-0.11	-0.45		-0.02
		D|R		1.25					-0.09	$-\varepsilon$	0.64	-0.53
		IA								0.13	2.36	
	NBD ↑1%	**X|S**	0.61					-0.90				
		X|R	ε	1.16	-3.25	-0.07		$-\varepsilon$	0.07	0.06	0.01	
		D|S	0.32	6.38				$-\varepsilon$	-0.16	-0.50	$-\varepsilon$	-0.18
		D|R		0.98					-0.08	$-\varepsilon$	-0.26	-0.44
		IA									0.22	

Quantities denote average changes (Panel A) and total changes (Panel B) in market-m sales for firms with pre-/post-shock statuses (p, q) (all changes in basis points). X for exporter, D for domestic-only, S for credit-satiated, R for credit-rationed, and IA for inactive. ε indicates non-zero changes smaller than 1E-2 units in magnitude.

Table 5: Financial Development Shocks: Trade Margin Decomposition

Margin	**Type**	**Domestic Sales**			**Foreign Sales**		
		LBD	**NBD**	**NTC**	**LBD**	**NBD**	**NTC**
Intensive	Export Status Change	-0.10	-0.18	-0.67			
	¬Export Status Change	1.34	-1.04	-12.42	-1.24	2.33	30.16
Extensive	Market Size Effect	-1.56	-0.55	1.33	-1.56	-0.55	1.33
	Distribution Shift	1.84	-0.40	-5.93	0.49	4.36	20.76
Total	Total Change in B.P.	1.53	-2.17	-17.68	-2.32	6.14	52.25

Quantities denote the post-shock changes in total aggregate market-m sales in basis points.

Table 6: Financial Liberalization, Banking Specialization, and Export

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Panel A: Baseline regressions									
	Extensive Margin $\mathbb{1}\{q_x > 0\}$					Intensive Margin Export Share of Sales				
VARIABLES	Probit	Probit	Probit	Probit	2SLS	OLS	OLS	OLS	OLS	2SLS
Total branches	2.074**	2.360*	2.045	6.438**	-0.196	126.881***	93.853***	231.092***	248.969***	374.744*
	(0.933)	(1.217)	(2.124)	(2.625)	(3.557)	(18.807)	(21.562)	(41.042)	(52.309)	(203.568)
Total branches * RZ		-0.816		2.073	1.636		100.845**		148.910***	16.658
		(2.051)		(2.451)	(4.504)		(38.355)		(48.060)	(182.105)
Local branches			0.037	-5.148	-1.707			-133.581***	-203.784***	-327.704*
			(2.650)	(3.278)	(3.125)			(49.494)	(66.659)	(179.115)
Local branches * RZ				15.707***	0.593				190.305	702.057**
				(5.806)	(5.597)				(116.189)	(345.549)
+ controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
+ area & industry f.e.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,906	2,906	2,906	2,906	2,909	2,220	2,220	2,220	2,220	2,220
R-squared	0.131	0.131	0.131	0.134	0.131	0.179	0.182	0.182	0.186	0.169
	Panel B: Subsampling by financial tensions				Panel C: Subsampling by bank nature					
	Subsampling (leverage)		Subsampling (rationing)		Full sample		Excluding main provinces		Full sample	
	> median	≤ median	Yes	No	High reliance on local banks	Low reliance on local banks	High reliance on local banks	Low reliance on local banks	High rel. local banks & ≥5 yrs of rel	Low reliance on local banks
	Export Share of Sales				Export Share of Sales					
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Total branches	238.340***	217.397***	364.995***	199.344***	230.200***	221.272***	210.643***	195.046***	234.953***	221.272***
	(69.126)	(58.951)	(117.501)	(39.127)	(53.842)	(69.243)	(53.427)	(71.927)	(56.234)	(69.243)
Local branches	-120.362	-144.004**	-220.750	-111.152**	-139.395**	-106.522	-123.250*	-79.511	-154.841**	-106.522
	(89.163)	(65.564)	(135.677)	(45.965)	(69.945)	(84.535)	(70.189)	(85.979)	(72.661)	(84.535)
+ controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
+ area & industry f.e.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,104	1,115	273	1,920	1,354	866	1,071	716	1,230	866
R-squared	0.200	0.178	0.263	0.182	0.187	0.222	0.199	0.222	0.192	0.222

Standard errors clustered at the provincial level are in parentheses. All the regressions control for: the number of employees; (log) capital intensity; age; labour productivity; a dummy variable indicating if the firm is a corporation; a dummy variable indicating if the firm is part of a consortium; bank branch density (in 1991); geographical area fixed effects; and industry fixed effects. In the regressions in columns (7)-(8) of Panel C we exclude the firms located in the provinces where the main national banks have their headquarters (Milano, Roma, Torino, Siena and Napoli). See Section 2.2 and Table A2 for details on the variables.

Table 7: Robustness Tests

	(1)	(2)	(3)	(4)	(5)	(6)
	Alt. measure Int. Margin	Destination area fixed effects				Panel data analysis
	ln(Exports)	$\mathbb{1}\{q_x > 0\}$		Export Share of Sales		$\mathbb{1}\{q_x > 0\}$
VARIABLES	OLS	Probit	2SLS	OLS	2SLS	OLS
Total branches	8.597***	4.578*	0.248	198.047***	353.296*	2.010**
	(3.045)	(2.694)	(2.961)	(49.493)	(185.213)	(0.849)
Total branches * RZ	6.491**	1.705	0.361	145.623***	-21.675	1.092
	(2.918)	(2.389)	(0.361)	(46.461)	(173.503)	(0.831)
Local branches	-6.920*	-3.822	-2.047	-149.390**	-312.045*	-0.606
	(3.737)	(3.315)	(2.616)	(61.907)	(161.890)	(1.340)
Local branches * RZ	11.201	9.677*	-0.078	91.174	553.406*	4.382**
	(7.588)	(5.733)	(4.998)	(107.681)	(318.216)	(1.988)
+ controls	Y	Y	Y	Y	Y	Y
+ area f.e.	Y	Y	Y	Y	Y	N
+ industry f.e.	Y	Y	Y	Y	Y	Y
+ destination f.e.	N	Y	Y	Y	Y	N
+ provincial & time f.e.	N	N	N	N	N	Y
Observations	2,219	2,909	2,909	2,220	2,220	3,776
R-squared	0.373	0.318	0.257	0.259	0.240	0.164

Standard errors clustered at the provincial level are in parentheses. All the regressions control for: the number of employees; (log) capital intensity; age; labour productivity; a dummy variable indicating if the firm is a corporation; a dummy variable indicating if the firm is part of a consortium; bank branch density (in 1991); geographical area fixed effects; and industry fixed effects. The regressions in columns (2)-(5) control also for destination area fixed effects. The regression in column (6) controls also for provincial and time fixed effects. See Section 2.2 and Table A2 for details on the variables.

Table 8: Counterfactuals: Response Magnitudes of Trade and Financial Development Shocks

Category	Moments	(1) **NTC ↓ 1%**	(2) **LBD ↑1%**	(3) **NBD ↑1%**	(4) **LBD ↑10%**	(5) **NBD ↑ 10%**	(6) **TBD ↑1% & NTC ↓1%**
			(Re-scaled)				
Real Aggregates	Total Sales	2.3	19.3%	8.7%	4.1	1.8	3
	Domestic Sales	-17.7	-8.6%	12.3%	12.7	-18.2	-18.3
	Foreign Sales	52.3	-4.4%	11.8%	-17.4	51.9	56.5
	Mfg. Employment	2.4	57.3%	29.6%	12.7	5.6	4.3
	Active Firms	-6	-19.6%	18.2%	7.6	-12.6	-6.7
	Dom.-Only Firms	-52.4	-8.1%	15.0%	25.5	-78.9	-58.4
	Exporters	24.2	-3.3%	13.7%	-4	30.7	27.1
Financial Provision	Total Loans	3.5	52.7%	30.0%	17.3	8.9	6.3
	Std. Dev., Loan Size	11.5	-1.7%	46.6%	6	24.8	14.2
	Total Int. Pymts.	3.6	-51.6%	-30.1%	17.6	9	6.4
	Std. Dev., Int. Pymts.	12.7	5.6%	47.9%	8.6	26.9	14.8
	Rationing $\mid q_x > 0$	80.3	-103.8%	-72.5%	-677.5	-490	-34.5
	Rationing $\mid q_x = 0$	150.4	-27.7%	11.3%	-726.9	91.7	75.9
Firm Dist.	Effective Prod. $\tilde{\mu}$	6.7	7.2%	11.9%	5.9	8	8.2
	$\Pr(q_d > 0)$	-7.4	-37.3%	7.4%	22.3	-6.2	-5.6
	$\Pr(q_x > 0)$	22.8	3.4%	17.0%	10.6	37.1	28.2
	Avg. Size, Sales	8.3	-9.1%	15.7%	-3.5	14.4	9.6
	Std. Dev., Sales	9.9	-10.7%	34.6%	-4.5	14.2	10.8
	Avg. Size, Empl.	8.4	2.0%	21.4%	5	18.2	11
	Std. Dev., Empl.	10.8	-2.5%	43.7%	3.8	21.4	12.9

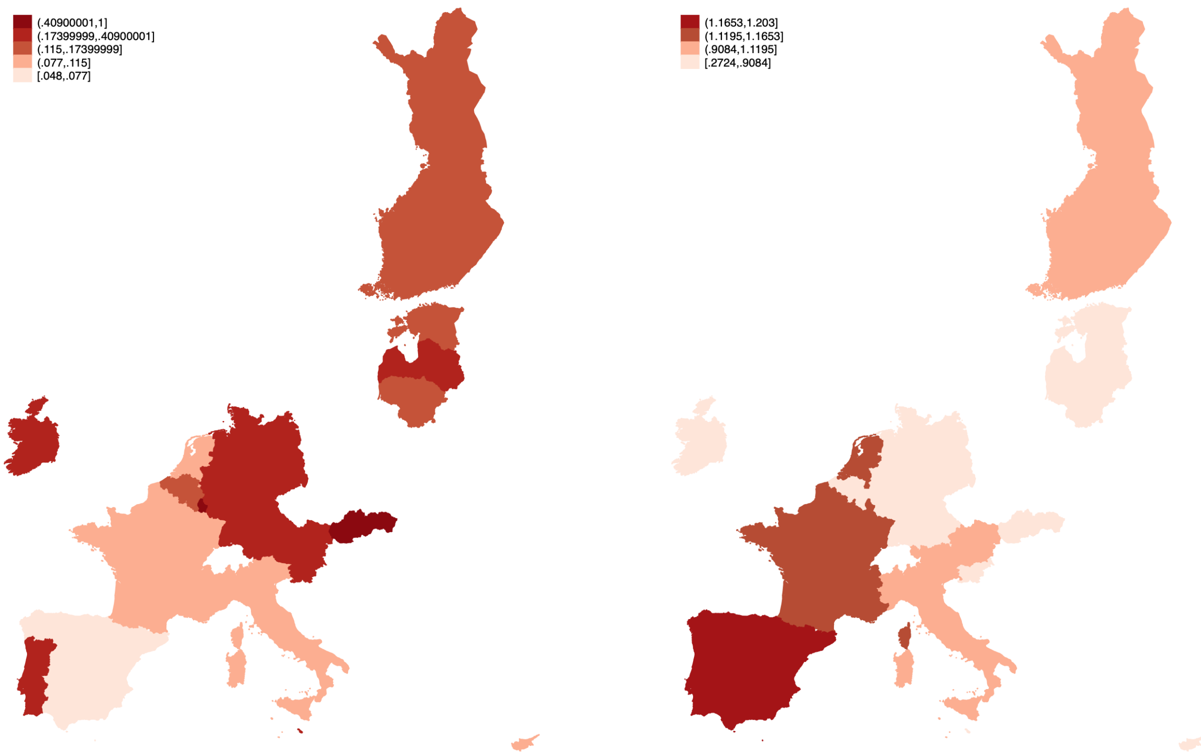
Columns (1), (4) and (5) provide the respective basis point responses of the given variables induced by: a 1% reduction in the net iceberg trade cost (NTC), $(\tau - 1)$; a 10% increase in locally specialized banking density; and a 10% increase in non-localistic banking density. The "rescaled" columns (2) and (3) normalize the responses to the original 1% locally specialized and non-localistic shocks given in Table 3 by the magnitudes of the corresponding 1% trade shock responses. Column (6) displays the basis point responses to the joint trade (NTC) and total banking development shock.

Online Appendices (for online publication)

These Online Appendices contain additional figures and tables (Appendix A), additional empirical tests (Appendix B), proofs of the model (Appendix C), further supporting analysis for some results of the model (Appendix D), and computational details (Appendix E).

A Appendix: Additional Figures & Tables

Figure A1: Banking Specialization and Banking Development in European Credit Markets

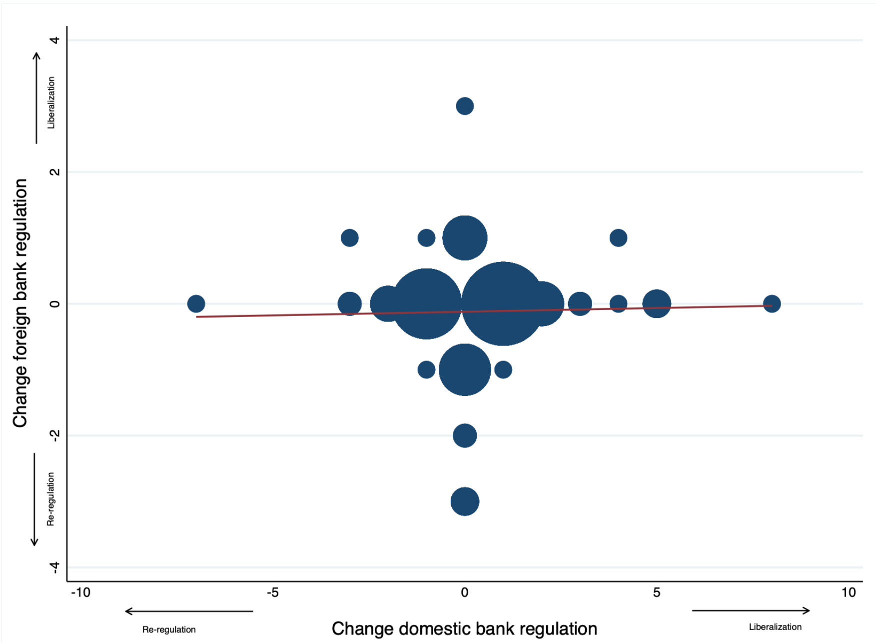


(a) % of total assets held by local banks

(b) Banks' total assets/GDP

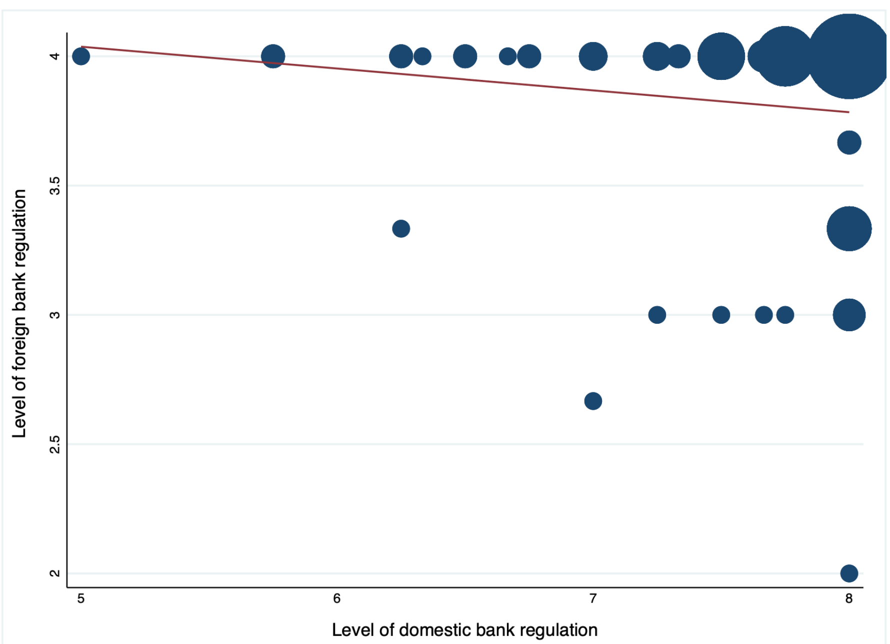
Figure (a) shows the share of total assets held by local banks in the country's banking sector in 2020. Figure (b) shows the ratio of banks' total assets over the country's GDP in 2020. Local banks are defined as the less significant banking institutions according to the ECB regulations. Source: Banks' supervisory reporting and ECB calculations.

Figure A2: Financial Liberalizations: Treatment of Domestic vs. Foreign Banks



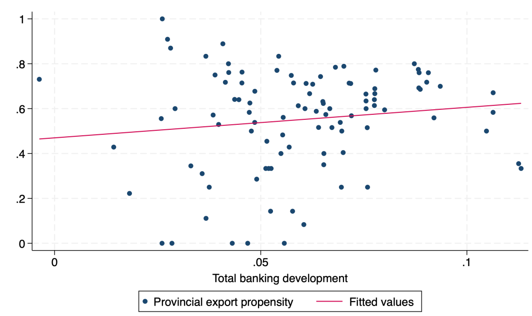
See Appendix B, Section B.1, for details.

Figure A3: Financial Regulations: Treatment of Domestic vs. Foreign Banks

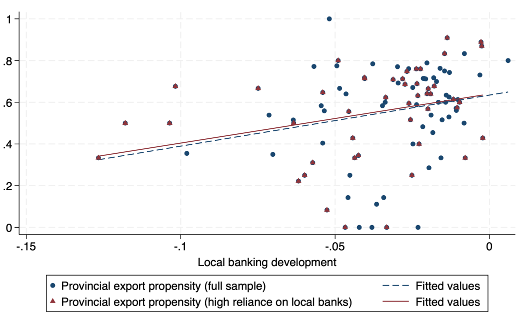


See Appendix B, Section B.1, for details.

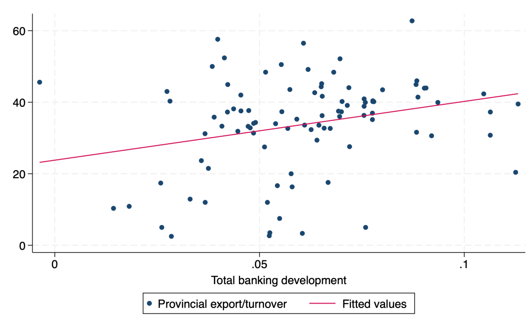
Figure A4: Banking Development, Banking Specialization and Export Activities in Italian Provinces



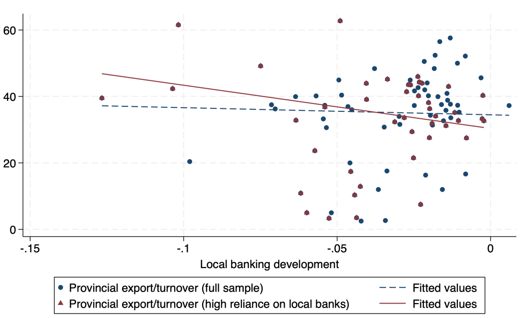
(a) Banking development & export propensity



(b) Local development & export propensity



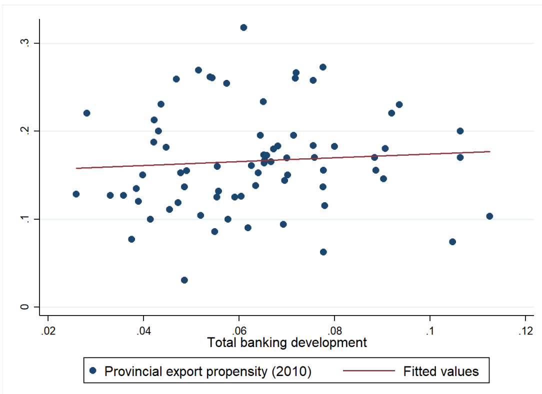
(c) Banking development & export intensity



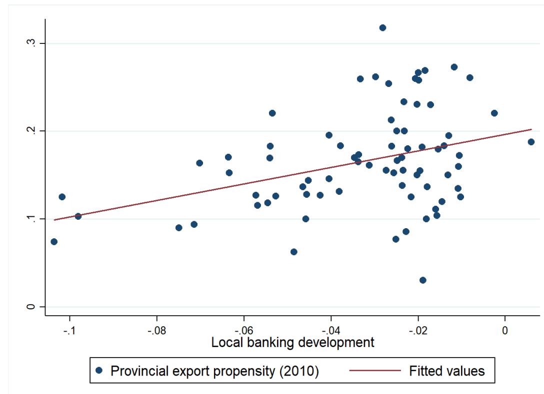
(d) Local development & export intensity

Export propensity is the share of exporting firms in a province in 1997. Export/turnover is the provincial average across firms in 1997. All export data are from the 1997 Mediocredito Centrale survey (see Section 2.2 for details). Total banking development is the mean percentage growth of all banks operating in a province over the 1991-1997 period. Local banking development is the mean percentage growth of credit cooperatives, popular banks, savings banks, and mutual and artisans' banks operating in a province over the 1991-1997 period. Bank data are from the Bank of Italy (see again Section 2.2 for details).

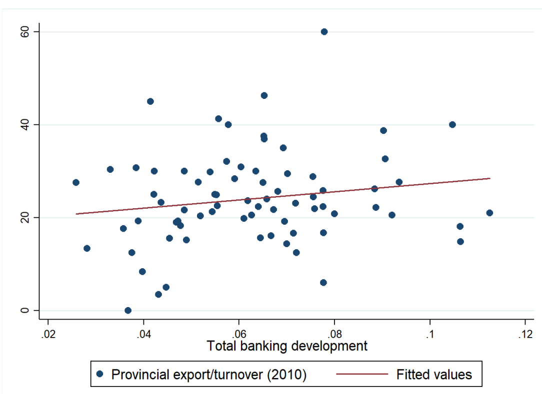
Figure A5: Banking Development, Banking Specialization and 2010 Export Activities in Italian Provinces



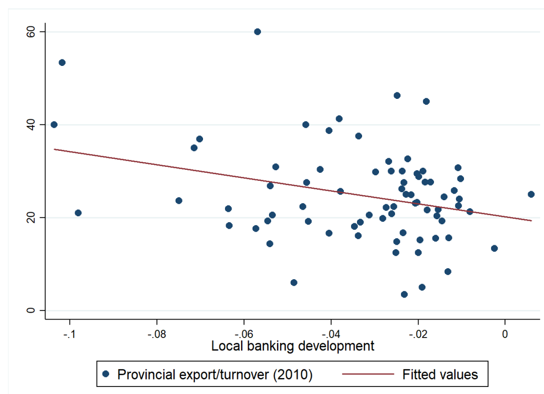
(a) Banking development & export propensity



(b) Local development & export propensity



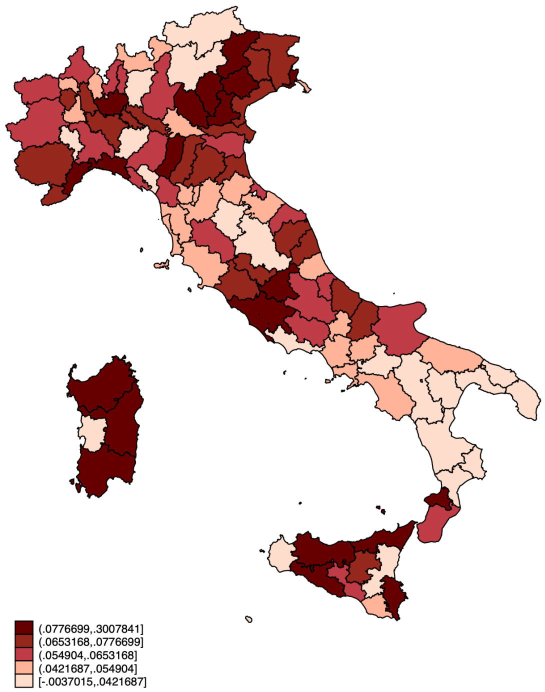
(c) Banking development & export intensity



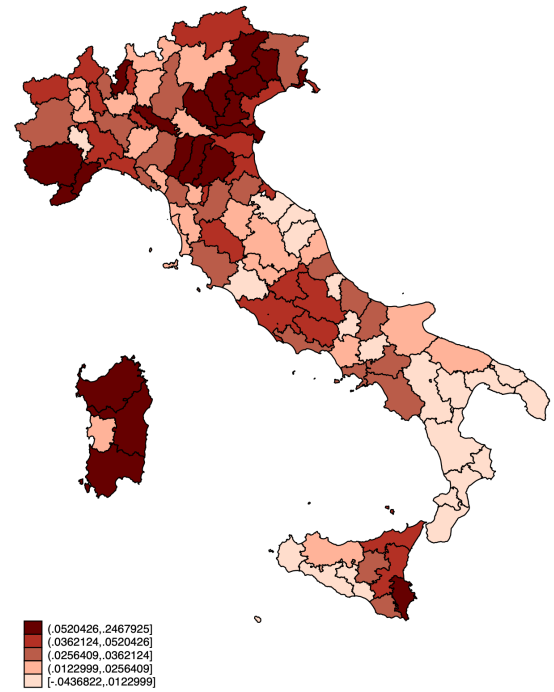
(d) Local development & export intensity

Export propensity is the share of exporting firms in a province in 2010. Export/turnover is the provincial average across firms in 2010. Total banking development is the mean percentage growth of all banks operating in a province over the 1991-1997 period. Local banking development is the mean percentage growth of credit cooperatives, popular banks, savings banks, and mutual and artisans' banks operating in a province over the 1991-1997 period. Bank data are from the Bank of Italy (see again Section 2.2 for details). Export data are from the VII UniCredit Survey on Small Businesses, a survey carried out by the Italian banking group UniCredit in 2010. This survey gathers data on a sample of Italian firms that are customers of the UniCredit bank, having turnover up to 5 million euros. The 2010 wave consists of 6,157 enterprises. The sample is representative of the referred bank's portfolio, whose composition is well diversified by sector, given the large dimension of the bank in terms of loans, deposits and branches. The sample was designed according to a stratified selection procedure so that findings are representative at company size level, individual sector level (where the sectors considered are agriculture, manufacturing, services, trade and construction) as well as at the territorial level (province).

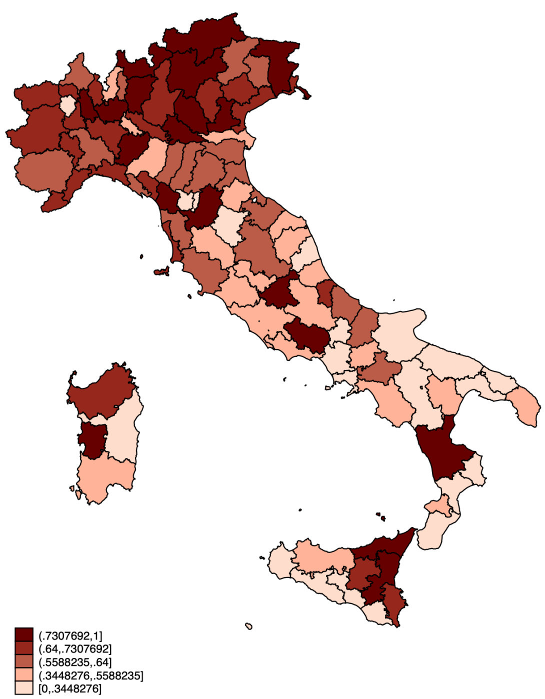
Figure A6: Geography of Banking Development, Banking Specialization and Export



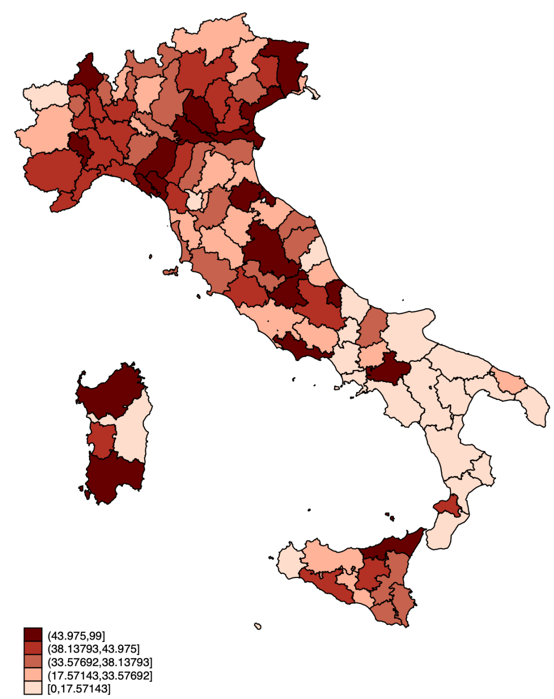
(a) Growth rate of total branches (mean, 1991-1997)



(b) Growth rate of local branches (mean, 1991-1997)



(c) Percentage of exporter firms (1997)



(d) Share of export over total turnover (mean, 1997)

Figure A7: Export Propensity and Banking Access over the Firm Size Distribution

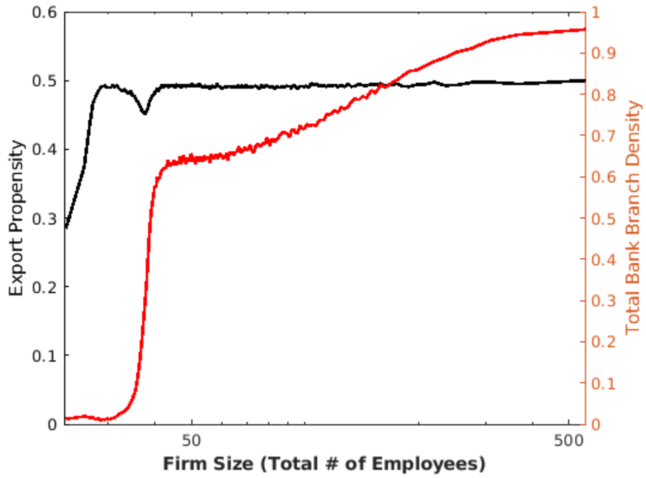
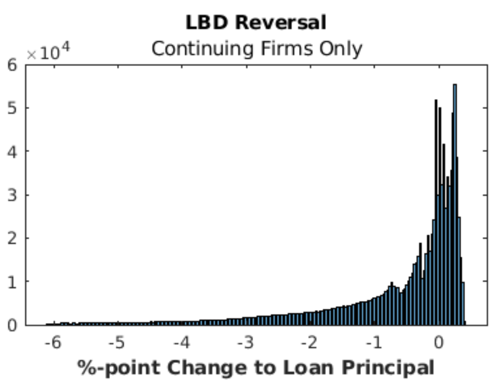
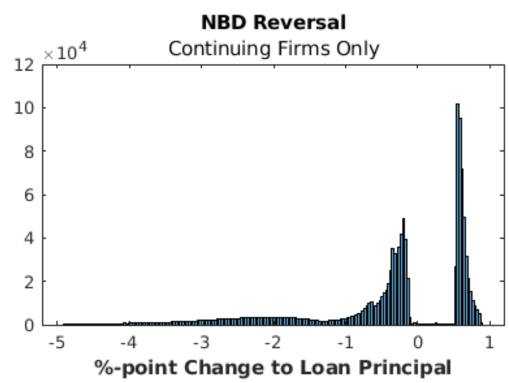


Figure A8: Heterogeneity in Firm Credit Access after a Re-regulatory Shock



(a) Reverting simulated LBD to 1990 levels generates loan principal declines for ≈ 61.2% of continuing firms. This shallowing of the locally specialized banking sector weakens industry competition, improving the relative performance of firms in provinces with higher LBD.



(b) Export sales decline worldwide following a symmetric NBD reversal - especially for rationed exporters. The resultant fall in import competition boosts domestic-only firms' relative performance. This creates the multi-modal distribution of loan principal changes seen here.

Pre-Shock (LBD Reversal)	Post-Shock Status: X|S	X|R	D|S	D|R	IA
X|S	35.8	1.1	-1.1		
X|R		-19.0	-8.4	-7.8	$-\varepsilon$
D|S	2.7	3.8	7.2	-0.5	-1.2
D|R		0.1		-23.8	-59.1
IA			0.8	0.8	

Pre-Shock (NBD Reversal)	Post-Shock Status: X|S	X|R	D|S	D|R	IA
X|S	4.8	-4.0	-9.1		
X|R		-42.3	-55.3	-9.2	
D|S		1.6	20.0	ε	
D|R		0.2	0.1	10.9	-0.8
IA			7.4	18.5	

Histogram winsorized at 2% and 98% percentiles for space considerations. Quantities denote the contributions of firms with pre-/post-shock statuses (p, q) to post-shock changes in **total** aggregate loans in basis points.

Table A1: Summary Statistics

	Full sample			Export status		
	Obs	Mean	*Std. Dev.*	Export	No Export	*t-stat*
Dependent variables						
Export	4489	0.660	*0.474*			
Share export (%)	3198	38.549	*28.762*			
Local banking development						
Total branches (growth rate)	4490	0.075	*0.042*	0.075	0.074	*-1.146*
Local branches (growth rate)	4490	0.044	*0.034*	0.045	0.041	*-3.934*
Control variables						
Number of employees	4480	117.741	*368.953*	147.675	59.779	*-9.631*
Capital intensity (ln)	2996	-7.293	*0.930*	-7.337	-7.185	*3.825*
Firm age (years)	4484	23.418	*18.394*	24.109	22.080	*-3.593*
Branches/ pop. (1991)	4390	0.375	*0.109*	0.383	0.361	*-6.186*
Corporation	4490	0.918	*0.275*	0.948	0.859	*-9.120*
Consortium	4486	0.100	*0.300*	0.109	0.083	*-2.802*
Labor productivity	2996	0.001	*0.001*	0.001	0.001	*0.375*
Traditional sectors	4490	0.418	*0.493*	0.402	0.450	*3.086*
Specialized sectors	4490	0.257	*0.436*	0.303	0.167	*-10.683*
Scale intensive sectors	4490	0.276	*0.447*	0.248	0.329	*5.613*
High-tech sectors	4490	0.049	*0.216*	0.047	0.054	*1.023*
North	4490	0.700	*0.458*	0.744	0.615	*-8.718*
Center	4490	0.173	*0.378*	0.163	0.190	*2.187*
South	4490	0.127	*0.333*	0.093	0.195	*8.959*
Leverage	3021	0.000	*0.003*	0.000	0.001	*2.333*
Rationing	4434	0.137	*0.344*	0.132	0.146	*1.209*
Reliance on locally headquartered banks	4490	0.628	*0.483*	0.622	0.638	*1.051*

This table reports summary statistics for the variables used in the estimations. See Appendix Table A2 for details on the definitions.

Table A2: Data Sources and Variable Definitions

Variable	Definition (source in parentheses)
Dependent variables	
Export	Equal to one if the firm exports in the survey year; zero otherwise. (SIMF)
Share export	Share of foreign sales over total turnover. (SIMF)
Local banking development	
Total branches	Avg. growth rate of bank branches in the province in 1991-97. (BI & ISTAT)
Local branches	Avg. growth rate of local bank branches in the province in 1991-97. (BI & ISTAT)
Control variables	
Number of employees	Total number of employees in the year of the survey. (SIMF)
Capital intensity	Ratio between tangible fixed assets and total employees. (SIMF)
Firm age	Number of years since inception. (SIMF)
Branches/population (1991)	Number of bank branches in the province per 100,000 persons in 1991 . (BI)
Corporation	Equal to one if the firm is a private and/or public limited company. (SIMF)
Consortium	Equal to one if the firm indicates it belongs to a consortium, zero otherwise. (SIMF)
Labor productivity	Ratio between value added and total employees. (SIMF)
Sector of activity	The survey reports the sector of activity of firms (ATECO code). Based on this information, firms are classified as traditional, scale intensive, specialized, and high tech using the Pavitt taxonomy. (SIMF)
North	Equal to one if the firm is located in a northern province; zero otherwise. (SIMF)
Center	Equal to one if the firm is located in a central province; zero otherwise. (SIMF)
South	Equal to one if the firm is located in a southern province; zero otherwise. (SIMF)
Leverage	Ratio of total liabilities to equity. (SIMF)
Rationing	Equal to one if the firm was rationed in the last year of the survey and zero otherwise. (SIMF)
Instrumental variables	
Local banks in 1936	Number of local bank branches in the province per 100,000 persons in 1936. (SFT)
Savings banks in 1936	Number of savings bank branches in the province per 100,000 persons in 1936. (SFT)
Mutual banks in 1936	Number of mutual bank branches in the province per 100,000 persons in 1936. (SFT)
Number of branches in 1936	Number of bank branches in the province per 100,000 persons in 1936. (SFT)

This table describes the definitions of the variables used in the paper. The data sources used for the empirical analysis include: (i) one wave of the Mediocredito Centrale Survey of Italian Manufacturing Firms (SIMF), which cover a three-year period ending in 1997; (ii) the province-level database of the Italian National Statistics Office (ISTAT); (iii) the Statistical Bulletin of the Bank of Italy (BI); and (iv) the book "Struttura funzionale e territoriale del sistema bancario italiano 1936-1974" (SFT) by the Bank of Italy.

Table A3: Financial Specialization, Firms' Financial Status, and Export

Panel A: Subsampling (leverage)								
	Extensive Margin (Export)				Intensive Margin (Share export)			
	Leverage >median		Leverage <median		Leverage >median		Leverage <median	
VARIABLES	Probit	Probit	Probit	Probit	OLS	OLS	OLS	OLS
Total branches	1.315	2.011	2.667***	2.004	146.510***	238.340***	102.595***	217.397***
	(1.094)	(2.864)	(1.004)	(2.559)	(26.142)	(69.126)	(20.133)	(58.951)
Local branches		-0.895		0.831		-120.362		-144.004**
		(3.595)		(2.993)		(89.163)		(65.564)
+ controls	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,463	1,463	1,439	1,439	1,104	1,104	1,115	1,115
R-squared	0.147	0.147	0.140	0.140	0.198	0.200	0.174	0.178
Panel B: Subsampling (rationing)								
	Extensive Margin (Export)				Intensive Margin (Share export)			
	Rationed		No Rationed		Rationed		No Rationed	
VARIABLES	Probit	Probit	Probit	Probit	OLS	OLS	OLS	OLS
Total branches	3.849	5.273	1.863**	1.832	193.757***	364.995***	112.401***	199.344***
	(2.428)	(5.244)	(0.910)	(2.220)	(59.174)	(117.501)	(20.275)	(39.127)
Local branches		-1.748		0.039		-220.750		-111.152**
		(6.195)		(2.702)		(135.677)		(45.965)
+ controls	Y	Y	Y	Y	Y	Y	Y	Y
Observations	353	353	2,495	2,495	273	273	1,920	1,920
R-squared	0.164	0.164	0.129	0.129	0.255	0.263	0.180	0.182

Standard errors clustered at the provincial level are in parentheses.

Table A4: Robustness: Controlling for Bank Provincial HHI

	Extensive Margin (Export)					Intensive Margin (Share export)				
VARIABLES	Probit	Probit	Probit	Probit	2SLS	OLS	OLS	OLS	OLS	2SLS
Total branches	2.074**	2.360**	2.043	6.424**	0.121	129.521***	98.165***	242.234***	261.448***	369.580*
	(0.924)	(1.196)	(2.120)	(2.613)	(3.550)	(18.765)	(21.605)	(42.069)	(54.258)	(201.161)
Total branches * RZ		-0.815		2.087	1.399		95.626**		143.677***	12.190
		(2.034)		(2.439)	(4.622)		(40.089)		(49.705)	(181.012)
Local branches			0.038	-5.143	-1.915			-144.015***	-213.747***	-317.228*
			(2.654)	(3.277)	(3.063)			(50.285)	(68.356)	(176.723)
Local branches * RZ				15.718***	0.683				190.730*	720.643**
				(5.813)	(5.610)				(117.456)	(342.851)
HHI	-0.006	-0.002	-0.007	-0.047	-0.095	26.623*	25.824*	30.284**	29.475**	27.940*
	(0.706)	(0.703)	(0.706)	(0.709)	(0.330)	(14.152)	(14.162)	(12.581)	(12.665)	(16.679)
+ controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
+ area & industry f.e.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,906	2,906	2,906	2,906	2,909	2,220	2,220	2,220	2,220	2,220
R-squared	0.131	0.131	0.131	0.134	0.132	0.181	0.184	0.184	0.188	0.169

Standard errors clustered at the provincial level are in parentheses. All the regressions control for: the number of employees; (log) capital intensity; age; labour productivity; a dummy variable indicating if the firm is a corporation; a dummy variable indicating if the firm is part of a consortium; bank branch density (in 1991); geographical area fixed effects; and industry fixed effects. See Sections 2.2 and 5.2 and Table A2 for details on the variables.

Table A5: Provincial Export Regressions: Summary Statistics

Δ_tVariable	Mean	Median	Std. Dev.	Obs.
(exports/cap.)$_{pt}$	259.615	155.211	507.465	412
ln(GDP less X/cap.)$_{rt}$	0.04211	0.04222	0.02230	412
(mfg. investment/cap.)$_{rt-2}$	29.786	29.737	68.401	412
ln(working-age pop.)$_{pt}$	-0.00283	-0.00262	0.00442	412
non-financial corp.$_{pt}$	1,228.296	497	1,720.08	412
ln(loc. branches/cap.)$_{pt}$	0.03634	0.03780	0.08803	412
ln(nloc. branches/cap.)$_{pt}$	0.03687	0.02153	0.12323	412
financial corp$_{pt}$	-21.12	-2	53.36	412

Table A6: Provincial Banking Environments and Export Intensity

	(1)	(2)	(3)	(4)	(5)	(6)
		(exports/capita)$_{pt}$			(real exports/capita)$_{pt}$	
ln(loc. branches/cap.)$_{pt}$	-468.4**	-540.2***	-476.9**	-459.2**	-385.9**	-436.6**
	(184.0)	(193.1)	(225.1)	(188.9)	(168.5)	(173.8)
ln(nloc. branches/cap.)$_{pt}$	287.4	238.8	212.7	195.5	196.0	240.1
	(209.1)	(207.7)	(225.4)	(228.0)	(219.0)	(227.0)
$\ln(\frac{\text{GDP-X}}{\text{cap.}})_{pt}$	-4,444.1***	-4,415.4***	-4,507.9***	-4,254.0***		
	(1,579.2)	(1,541.1)	(1,491.0)	(1,542.3)		
$\ln(\frac{\text{RGDP-RX}_1}{\text{cap.}})_{pt}$					-4,345.7***	
					(1,426.7)	
$\ln(\frac{\text{RGDP-RX}_2}{\text{cap.}})_{pt}$						-4,537.1***
						(1,448.7)
ln(working-age pop.)$_{pt}$	46,945.7**	47,005.7**	62,458.7***	35,633.5	25,064.1	15,533.7
	(23,050.2)	(23,126.7)	(22,182.1)	(28,173.7)	(26,077.3)	(26,312.5)
non-financial corp.$_{pt}$	0.0462	0.042	0.203***			
	(0.112)	(0.113)	(0.0358)			
(mfg. investment/cap.)$_{rt-2}$		0.882**	0.859***	0.710*		
		(0.362)	(0.324)	(0.371)		
(mfg. real investment/cap.)$_{rt-2}$					0.451	0.657*
					(0.312)	(0.334)
financial corp.$_{pt}$			-4.636***			
			(0.586)			
Test: ln(loc) = ln(nloc)	Reject	Reject	Reject	Reject	Reject	Reject
F-test	7.35***	7.97***	4.97**	5.67**	5.22**	6.72**
Provincial Sectoral Dynamics	No	No	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Export Deflator					UVI	Mfg. PPI
N	412	412	412	412	412	412
R^2	0.359	0.371	0.403	0.430	0.312	0.3686

All variables in specifications (1)-(6) have been first-differenced. Standard errors in parentheses.

Table A7: Counterfactuals: Changes to Aggr. Revenue by Firm Status

		Post-Shock Status									
		Δ Aggr. Foreign Revenues					**Δ Aggr. Domestic Revenues**				
Pre-Shock Status		**X|S**	**X|R**	**D|S**	**D|R**	**IA**	**X|S**	**X|R**	**D|S**	**D|R**	**IA**
LBD reversal	**X|S**	93.7	5.9	-3.2			29.2	0.9	ε		
	X|R		7.2	-24.7	-24.7	-ε		-13.5	1.1	1.7	-ε
	D|S	7.0	10.8				-ε	-0.2	15.6	0.7	-1.6
	D|R		0.5					-ε		-21.0	-66.0
	IA								1.1	1.0	
NBD reversal	**X|S**	-42.6	-12.2	-24.1			42.8	3.3	0.4		
	X|R		-75.9	-159.0	-31.8			-6.7	6.9	2.9	
	D|S		4.7					-0.1	26.6	ε	
	D|R		0.6					-ε	0.1	13.4	-0.9
	IA								9.7	20.7	
$(\tau - 1) \downarrow$**1%**	**X|S**	23.3	ε	-ε			-5.2	-ε	ε		
	X|R	ε	8.2	-3.1	-0.4		-ε	-1.8	ε	ε	
	D|S	4.6	17.2				-ε	-0.5	-2.6	-ε	-1.9
	D|R		2.5					-0.2	-ε	-1.5	-4.5
	IA									0.5	

Quantities denote the contributions of firms with pre-/post-shock statuses (p, q) to post-shock changes in **total** aggregate market-m sales in basis points.

B Appendix: Additional Empirical Investigations

This Appendix B comprises details on Appendix Figures A2 and A3 (B.1, which complements Section 2.2) and the province-level empirical analysis (B.2, which complements Section 5.2).

B.1 Details on Appendix Figures A2 and A3

In Appendix Figure A2 we present the (de)regulatory episodes of 180 countries in 1998-2012 according to their degree of restrictiveness for domestic and foreign banks. The horizontal axis uses as an indicator of domestic bank regulation the change in the "Entry into banking requirements" index; the vertical axis uses as indicator of foreign bank regulation the change in the "Limitations on Foreign Bank Entry/Ownership" index. The size of each bubble reflects the number of countries/waves that experience that change in regulation. The data are authors' calculations using the Barth, Caprio and Levine "World Bank Surveys on Bank Regulation" database. Appendix Figure A3 is analogous to Appendix Figure A2 but the data are in levels, rather than changes.

B.2 Province-level Analysis

We seek to explain the external trade of province p at time t as a function of its contemporaneous financial environment F_{pt}, other provincial characteristics Z_{pt}, time fixed effect δ_t, province fixed effect ζ_p, and province-specific trend η_p.

$$X_{pt} = F_{pt}\beta + Z_{pt}\gamma + \delta_t + \zeta_p + \eta_p * t + u_{pt} \tag{25}$$

Given large differences in economic development across provinces in Italy, we feel that allowing for province-specific trends is warranted. In keeping with a random trends model, we take the first difference of (25) to excise the spectre of ζ_p, then estimate the resultant differenced equation using fixed effects to account for the province-specific slope η_p.

We construct a balanced panel of the economic and financial structure of the Italian provinces over the years 1997 through 2001 using data from the Italian National Statistics Office, the Bank of Italy, and the Italian Union of Chambers of Commerce. Summary statistics are in Table A6. We discuss the measures below.

Local Financial and Economic Environment As detailed in Section 2, we use provincial counts of locally specialized and non-localistic bank branches from the Bank of Italy to measure the depth and composition of a provincial banking sector. We also employ provincial counts of financial corporations that have a contemporaneous registration with the Italy Business Register, sourced from the Movimprese dataset of the Italian Union of Chambers of Commerce. By financial corporations, we refer to firms listed under "societá di capitali" and classified under Section J65 of NACE Revision 1.1, "Financial intermediation, except pension and insurance". This broader category captures the activities of banks (central and commercial) as well as financial holding companies, trusts, fund, financial leasing firms, etc. We use this variable to capture provincial variation in the availability of non-bank finance.

Information on provincial and regional macroeconomic aggregates is from the Bank of Italy. We have exports and GDP at the provincial level. Since we employ the export measure for our dependent variable, we subtract exports from GDP before using it as a control. All provincial aggregates are scaled by population in our empirical specifications. Information on fixed investment during our time window is only available at the regional level; as such, we use total regional manufacturing investment in our main specifications, scaled by regional population. We obtain estimates of population and working-age population from the Italian National Statistics Office

(ISTAT). The former is used to construct our bank branch density measures while the latter is used as a crude proxy of the provincial labor supply.

In addition to the financial corporation registration counts mentioned earlier, we obtain several others. First, we use the total count of provincial corporations in tandem with our financial corporation counts to create a non-financial corporation counts. Second, we tabulate firm counts at the NACE Rev. 1.1 sectoral level. These counts are used in place of the financial/non-financial counts as part of a more thorough empirical specification that better captures differences in provincial economic structure.

Price Indices We obtain data on the GDP implicit price deflator and the producer price index - domestic investment from the Organization for Economic Cooperation and Development (OECD). Accounting for changes in export prices is more difficult. We do not have access to a true export price index. We have access to an export unit value index (UVI) through ISTAT; however, use of UVIs in place of export prices indices will generally lead to biased results. We therefore provide two sets of point-estimates: one set of estimates that makes no attempt to account for price differences; and a second set that makes use of what indices we do have available in an attempt to control for inflations. With respect to the latter: we do use ISTAT's export unit-value index to deflate provincial exports in one specification, but we also re-run the specification using the producer price index for Italian manufacturers. This last measures is also obtained through the OECD.

Estimates Appendix Table A6 displays the estimates. As noted, we employ both first differences and provincial fixed effects to allow for province-specific random slope. Hereafter, when we speak of a variable, we refer to its first difference. In the first specification, our locally specialized bank branch measure has an economically and statistically significant negative coefficient. We can interpret this as indicating that a percentage-point increase in the growth rate of locally specialized bank branches per capita generates a -497.10 euro reduction in exports per capita. Our non-localistic bank measure is positive, as expected, but not significant.

Our second specification makes use of our regional manufacturing fixed investment measure. As Kydland and Prescott (1982) find that the average construction period for plants is nearly two years, we use its second lag. Its coefficient suggests that for every dollar increase in investment intensity, export intensity increases 88 cents. Unsurprisingly, the magnitudes of our banking variables decrease with the inclusion of the fixed investment measure.

While the inclusion of the provincial nonfinancial corporation counts in our final specification reduces the magnitude of the coefficient on our locally specialized banking measure, the latter remains economically and statistically significant. The coefficient on our financial firm count variable is negative, which may seem counterintuitive; however, if we refer to the summary statistics in Appendix Table A6, we see that the count of financial firms per province decreased by an average of 25.2 firms per year during the 1997-2001 period.

Studies on Italian banks in the 1990s find increases in consolidation and efficiency. We interpret this result as likely being reflective of that trend. Note further that, with the inclusion of the financial corporation count variable, the coefficient on the non-financial corporation variable becomes positive and significant. Clearly, increases in non-financial firms counts were negatively correlated with increases in financial corporations during this period. This, too, is consonant with the notion that the reorganization of the financial sector during this period may have been pro-competitive.

Removal of the financial and non-financial corporation counts in favor of the natural logarithm of firm counts by sector leaves most of our point estimates unchanged. When we use the export UVI to deflate gross exports, we see a large decrease in the absolute magnitude of the coefficent on our locally specialized banking measure; however, it remains negative and statistically significant. Use of the Italian Manufacturing Producer Price Index to deflate exports yields qualitatively and quantitatively similar results, albeit with a smaller reduction in the absolute magnitude of the coefficient on our locally specialized banking measure.

Although the coefficient on our non-localistic banking measure was not significant in our specifications, we consistently reject the hypothesis that its coefficient and the coefficient on locally specialized banking are the same. All told, we continue to find a difference between locally specialized and non-localistic banking presences and their correlations with export growth.

C Appendix: Proofs

C.1 Existence, Uniqueness, & Efficiency

Note: We do not allow for behavioral or mixed strategies here. If the entrepreneur is ever indifferent towards export, we assume they enter export. If they is ever indifferent between the good and bad technologies, they picks the technology the bank prefers. Finally, if the bank is ever indifferent between accepting and rejecting a contract, it accepts.[1]

We proceed by backward induction. For the sake of brevity, we only detail the subgame in which the entrepreneur has decided to enter the export market - the proofs are analogous in the case in which the entrepreneur only serves the domestic market. Additionally, for the sake of simplicity where the industry simulation is concerned, we do not consider the possibility in which the entrepreneur only enters the export market; in any case, consideration of this case would not substantively change the argument made here.

We refer to the entrepreneur's strategy as s_e and the bank's strategy as s_b. Then, s_e is a

1. Essentially, we assume that agent indifference in a subgame never presents an obstacle to the two agents from agreeing to a debt contract with a strictly positive principal.

tuple $\{X, \{q_m\}_{m \in C_m}, D(K), T(\cdot)\}$ in which:

- $X \in \{0,1\}$ is an export entry decision where $X = 1$ if the entrepreneur enters export and is otherwise equal to 0;
- $\{q_m\}_{m \in C_m}$ is a set of market scale best-response functions;
- $D = \{R_b, L, \{q_m\}_{m \in C_m}, K\} \in \mathbb{R}^4 \times \{0,1\}$ is a loan contract offer in which $K = 1$ if the entrepreneur grants the bank collateral liquidation rights and is otherwise equal to 0; and
- $T(\cdot) = T(X, D(K); s_b) \in \{0,1\}$ is a technological best-response function where $T(\cdot) = 1$ if the entrepreneur chooses the good Technology and is 0 otherwise.

The bank's strategy is a tuple $s_b = \{A(\cdot), \{\ell_m(\cdot) = \ell_1(X, D(K))\}_{m \in C_m}\}$ where:

- $A(\cdot) = A(X, D(K))$ is a loan-contract acceptance best-response function where A = 1 in the bank accepts the entrepreneur's contract offer and is 0 otherwise; and
- $\{\ell_m(\cdot) = \ell_1(X, D(K))\}_{m \in C_m}$ is a set of market-m monitoring best response functions.

C.1.1 Entrepreneur's Choice of Technology

The last proper subgame consists of the entrepreneur's choice of the joint production technology, which will determine the probability with which their production activities are successful. The entrepreneur chooses the good technology if and only if

$$\gamma\big(\sum_m R_m - R_b\big) - E \geq \sum_m (1 - b_m)V_m - E. \tag{26}$$

Recall that the entrepreneur can commit to their market scale choice. Regardless of whether collateral liquidation rights are granted to the bank, bank monitoring still affects the choice of technology through its effect on the entrepreneur's private benefit under the bad technology.

Generally, (expected) payoffs are of the form $\pi_i(X, D(K), A, b_d, b_x, T)$ for each agent i. Here, the agents receive:

$$\begin{aligned}
\pi_e(1, D(1), 1, \ell_d, \ell_x, 1) &= \gamma(\sum_m R_m - R_b) - E(1+r) \\
\pi_b(1, D(1), 1, \ell_d, \ell_x, 1) &= \gamma R_b + (1-\gamma)\sum_m C_m - (1+r)[\sum_m \{I_m + F_m + \ell_m\} - E] \\
\pi_e(1, D(1), 1, \ell_d, \ell_x, 0) &= \sum_m \{(1-b_m)(I_m + F_m)\} - E \\
\pi_b(1, D(1), 1, \ell_d, \ell_x, 0) &= \sum_m C_m - (1+r)[\sum_m \{I_m + F_m + \ell_m\} - E] \\
\pi_e(1, D(0), 1, \ell_d, \ell_x, 1) &= \gamma(\sum_m R_m - R_b) - E \\
\pi_b(1, D(0), 1, \ell_d, \ell_x, 1) &= \gamma R_b - (1+r)[\sum_m \{I_m + F_m\} - E] \\
\pi_e(1, D(0), 1, \ell_d, \ell_x, 0) &= \sum_m \{(1-b_m)(I_m + F_m)\} - E \\
\pi_b(1, D(0), 1, \ell_d, \ell_x, 0) &= -(1+r)[\sum_m \{I_m + F_m + \ell_m\} - E]
\end{aligned} \tag{27}$$

C.1.2 Bank's Monitoring Choice

The bank here chooses whether or not to monitor, and if so, how much to monitor an entrepreneur's projects. Then, given the collateral liquidation rights K, the loan repayment offer

R_b, the bank solves

$$(\ell_d, \ell_x) = \text{argmax}\{\pi_b(b_d, b_x|D, T)\}$$

where

$$\pi_b(b_d, b_x|D,T) = \begin{cases} \max_{(b_d,b_x)\in\Gamma^T} \{T * \gamma R_b + (1 - T * \gamma)K * \sum_m C_m \\ \qquad -(1+r)[\sum_m \{I_m + F_m + \ell_m\} - E] \\ \quad \text{where} \\ \Gamma^1 = \{(b_d, b_x) \in [0,1]^2 : T(1, C(K)) = 1\} \\ \Gamma^0 = \{(b_d, b_x) \in [0,1]^2 : T(1, C(K)) = 0\} \end{cases} \tag{28}$$

By our assumptions on the bank's monitoring cost functions, (1) the 2nd derivative of the objective function in the case of domestic-only operations is negative, and (2) the Hessian of the objective in the case of operations in both markets is negative definite. As such, a unique maximum exists.

Essentially, the bank will choose monitoring levels that induce the highest payoff it can obtain under either technology conditional on its liquidation rights. Thus, given the contract $D = \{R_b, L, K\}$, the bank will choose monitoring levels that do not induce incentive compatibility if it is optimal to do so.

The unified incentive compatibility constraint and the bank's first order conditions together implicitly define its optimal monitoring best-response functions $(\ell_d(\cdot), \ell_x(\cdot))$.

C.1.3 Bank's Response to Contract Offer

When offered a debt contract $D = \{R_b, L, K\}$, the bank only accepts if its optimal choice of monitoring under the contract induces a technological choice that does not violate the bank's individual rationality condition. That is,

$$\max_{b_d, b_x} \pi_b(b_d, b_x | T) \geq 0 \tag{29}$$

where $T = \text{argmax}\{\pi_e(B; b_d, b_x), \pi_e(G; b_d, b_x)\}$.

C.1.4 Entrepreneur's Contract Offer

We will show at this stage that the entrepreneur's equilibrium offer will allow them to appropriate all economic surplus; to do so, we must first establish the following claim:

Lemma 2. Any contract that induces use of the bad technology that the bank accepts will never be offered by the entrepreneur.

Proof. (By contradiction) Suppose not. Then there exists a contract offer D that satisfies the bank's participation constraint, does not satisfy the entrepreneur's incentive compatibility constraint, but satisfies the entrepreneur's individual rationality constraint; that is:

$$\sum_m B_m - [\sum_m \{I_m + F_m + \ell_m\} - E](1+r) \geq 0$$

$$\sum_m \{(1 - b_m)(I_m + F_m)\} - E \geq rE$$

Rearranging,

$$E(1+r) \geq \sum_m \{(1 - b_m + r)I_m + (1+r)(F_m + \ell_m)\}$$

$$\sum_m \{(1 - b_m)(I_m + F_m)\} \geq E(1+r)$$

But this implies

$$\sum_m \{(1 - b_m)(I_m + F_m)\} \geq \sum_m \{(1 - b_m + r)I_m + (1+r)(F_m + \ell_m)\}$$

$$0 \geq \sum_m \{rI_m + (b_m + r)F_m + (1+r)\ell_m\}$$

Since $I_m, F_m,$ and $\ell_m \geq 0$, we have reached a contradiction. $\rightarrow\leftarrow$

$\square$

With these results in hand, we present the following:

Lemma 1. The entrepreneur's SPNE contract allows them to appropriate all surplus.

Proof. Since the bank will reject any contract that does not both induce use of the good technology and satisfy its participation constraint, the entrepreneur maximizes their returns from a contract that that the bank will accept. Their program takes the following form:

$$\max_{p_m,E}\{\gamma(\sum_m R_m - R_b) - E\}$$

subject to the following constraints

$$\gamma R_b \geq \big[\sum_m \{I_m + F_m + \ell_m\} - E\big](1+r) - (1-\gamma) * K * \sum_m C_m \tag{30}$$

$$\gamma(\sum_m R_m - R_b) - E \geq \sum_m \{(1-b_m)(I_m + F_m)\} - E;\ \ell_m = \ell_m(p_m, E)$$

Under profit maximization, the bank's participation constraint must always bind; else, the entrepreneur could do strictly better by reducing the bank's repayment R_b. Accordingly, we may substitute for R_b both in the objective function and the incentive constraint using the participation constraint of the bank[2]. The entrepreneur thus equivalently solves:

$$\max_{p_m,E}\{\gamma \sum_m R_m + (1-\gamma) * K * \sum_m C_m - (1+r)\sum_m \{I_m + F_m + \ell_m\} + rE\}$$

subject to the following constraints (31)

$$\gamma(\sum_m R_m - R_b) - E \geq \sum_m \{(1-b_m)(I_m + F_m)\} - E;\ \ell_m = \ell_m(p_d, p_x, E)$$

It is obvious that $K * \sum_m C_m\Big|_{K=1} \geq K * \sum_m C_m\Big|_{K=0} = 0$. The entrepreneur cannot extract surplus from the bank through use of the bad technology; however, by allocating liquidation right to the bank, the entrepreneur provides the bank both the means and the incentive to create surplus. This surplus will be appropriated in its entirety by the entrepreneur through a careful choice of repayment amount R_b. As such, the entrepreneur's optimal debt contract offer

2. We refer to this transformed incentive constraint as "the reduced incentive compatibility constraint".

allows the entrepreneur to appropriate all project surplus. □

With this idea in hand, the following corollary follows:

Corollary 1. The SPNE allocation is constrained Pareto-efficient and can be obtained by solving the following maximization program:

$$\max_{p_m,\ell_m,E} \sum_m \{\gamma R_m + (1-\gamma)C_m - V(1+r)(1+\Psi)\} + rE$$
$$\text{subject to} \tag{32}$$
$$\pi_e \geq \sum_m (1-b_m)V_m - E; \quad E \leq W.$$

Proof. We have the following:

1. the firm is able to commit ex-ante to destination-market prices (by assumption); and

2. the firm's vector of equity investment and destination-market prices $(E, p_d, p_x) \in \mathbb{R}^3_+$ imply a unique vector of bank monitoring labor choices $\ell_m(E, p_d, p_x)$, $\forall m$ (by the strict convexity of the bank's monitoring technology).

Suppose we were to allow the entrepreneur to "choose" bank monitoring. Since the entrepreneur captures all surplus (including monitoring surplus), the entrepreneur would choose the monitoring levels ℓ_m $\forall m$ that maximize profits, taking destination-market price levels as given. In other words, the entrepreneur would make a monitoring labor level choice identical to that of the bank. Furthermore, in a world where the entrepreneur can choose monitoring labor, the entrepreneur would maximize destination-market profits with respect to destination-market prices, taking its own monitoring level choices as given. Of course, the entrepreneur does not choose bank monitoring; however, it can implement the equilibrium given above by choosing destination-market prices p_m as if it did control bank monitoring levels. Finally, it can expropriate all of the bank's surplus by choosing R_b such that the bank breaks even only at the point at which they implement the monitoring levels consistent with the firm's destination-market prices. Therefore,

$$(p_d, p_x, E) = \underset{p_m, \ell_m, E}{\text{argmax}} \sum_m \{\gamma R_m + (1-\gamma)C_m - V(1+r)(1+\Psi)\} + rE$$
$$\text{subject to} \tag{33}$$
$$\pi_e \geq \sum_m (1-b_m)V_m - E; \quad E \leq W.$$

Furthermore, since this allocation is consistent with an allocation in which there are (1) no coordination problems and (2) any deviation from this allocation would render the bank worse-off, this allocation is at least constrainted Pareto-efficient. □

Finally:

$$\begin{aligned} \pi_e(1, C(1), 0, \ell_m, T) &= 0 \\ \pi_b(1, C(1), 0, \ell_m, T) &= 0 \\ \pi_e(1, C(0), 0, \ell_m, T) &= 0 \\ \pi_b(1, C(0), 0, \ell_m, T) &= 0 \end{aligned} \tag{34}$$

As such, $A = \mathbb{1}\{\max_{\ell_m} \pi_b(\ell_m | T(\ell_m)) \geq 0\}$.

C.1.5 Entrepreneur's Extensive Margin Decision

The entrepreneur optimal export entry function is given by

$$X = \mathbb{1}\{\pi_e(b_d, b_x, G) \geq \pi_e(b_d, G)\} \tag{35}$$

Recalling our assumptions on player behavior, the strategy profiles we have constructed here constitutes a unique, subgame-perfect Nash equilibrium.

D Appendix: Supporting Analysis

This Appendix D comprises further anecdotal evidence for the separation of monitoring activity by destination-market (D.1, which complements Section 3.1.3), details on the decomposition of the margins of trade (D.2, which complements Section 3.3.2), details on the effects of a joint shock (D.3.1, which complements Section 5), and details on the re-regulation and trade cost shock experiments (D.3.2, which complement Section 6).

D.1 Separating Monitored Activity by Destination-Market

We provide here an excerpt from the Financial Action Task Force's "Trade-Based Money Laundering: Risk Indicators" which highlights that, to detect a client's misbehavior, a bank must understand what the right behavior should look like in the destination market:

> "Contracts, invoices, or other trade documents display fees or prices that do not seem to be in line with commercial considerations, are inconsistent with market value, or significantly fluctuate from previous comparable transactions....
>
> "The trade entity makes unconventional or overly complex use of financial products, e.g. use of letters of credit for unusually long or frequently extended periods without any apparent reason, intermingling of different types of trade finance products for different segments of trade transactions....
>
> "The trade entity engages in transactions and shipping routes or methods that are inconsistent with standard business practices....
>
> "Payments are sent or received in large round amounts for trade in sectors where this is deemed as unusual (FATF and Egmont Group 2021)."

While money-laundering represents an extreme case of activities that bank monitoring is intended to detect, its use here is instructive; in order to detect misbehavior on the part of a bank client, the bank itself must understand what the right behavior should look like in the market of operation.

D.2 Decomposing the Margins of Trade

Recall that the quantity of exporters $M_x = p_x M_e$ and note that p_C is unchanged between equilibria by construction. Therefore, $|p_C(M_{e1} - M_{e0})|$ represents firms whose export status changes and cannot be considered incumbents. Since intensive margin changes measure differences in exports among those already exporting, the intensive margin term should always use the smaller of the two entry mass terms. For sufficiently small shocks, the choice of which zero to add to the terms relating to firms whose export status changes between equilibria is immaterial as the quantitative difference between choices is negligible.

To see why, note that smaller shocks will generate smaller changes to the region of the firm parameter space for which export is optimal. Therefore, for a sufficiently small change, the probability of a firm that exports in one equilibrium but not another is very small. Since our theoretical environment is well-behaved, small shocks should also general small changes to M_e. As such, the market size extensive margin effect for export status-changing firms will be essentially zero for whatever choice of "zero" is used to rearrange the expression.

With this in mind, we offer our decomposition below[3]:

$$\Delta X = \underbrace{p_C M_{e1} \Delta(\mathbb{E}_C[r_{xt}])}_{\text{intensive margin}} + \overbrace{\begin{pmatrix} p_C \mathbb{E}_C[r_{x0}] \Delta(M_{et}) \\ + p_{A0} \mathbb{E}_{A0}[r_{x0}] \Delta(M_{et}) \end{pmatrix}}^{\text{market size}} + \underbrace{M_{e1} \Delta(p_{At} \mathbb{E}_{At}[r_{xt}])}_{\text{distribution shift}} \tag{36}$$

3. Here, we add $p_C M_{e1} \mathbb{E}_I[r_{x0}] - p_C M_{e1} \mathbb{E}_C[r_{x0}]$ to the top line and $p_{A0} \mathbb{E}_{A0}[r_{x0}] M_{e1} - p_{A0} \mathbb{E}_{A0}[r_{x0}] M_{e1}$ to the bottom line.

D.3 Response of Financial Aggregates to Counterfactual Shocks

D.3.1 Re-regulation Experiments

Roadmap We first show how reversals in locally specialized/non-localistic banking development generate different distributions of changes to credit access; then, we will map these changes into firms' export responses. The reader should bear in mind that, since we are considering re-regulations, the signs of the effects will be reversed relative to those of Section 5.

Patterns of Credit Reallocation Appendix Figure A6 shows how LBD and NBD reversals generate starkly different distributions of credit access responses. The LBD reversal causes a general deterioration of domestic inventory pledgeability, reducing domestic production scales and weakening industry competition. For firms with the smallest reductions in credit access, this is a good thing. Recall from equation 20 that in order for a firm to experience positive revenue growth following a shock, its post-shock gains (losses) in financial access must dominate the market gains (losses) in market size and average industry effective productivity. For these firms with below-average financial access losses, the shock's weakening of competition overall has actually improved their relative competitive position, as their better ex-post access to credit allows them to dominate firms with weaker access to credit. In essence, the LBD reversal has redistributed credit from the financially vulnerable to the financially strong.

The intuition of equation (20) also applies to the case of the NBD reversal, provided that we recall that NBD reversals can only directly affect firms that were strong/productive enough to enter export markets in the first place. NBD reversals reduce the non-localistic monitoring access (and by extension, overall pledgeability of income) of these firms, generating sizable reductions in their credit access. Since this shock is symmetric, this creates a weakening of export competitiveness worldwide - and by extension, a weakening of import competitiveness.

Weakened import competition improves the relative market position of domestic-only firms, making them more profitable and improving their credit access. Since firms that were strong enough to enter export lose credit access and firms too weak to enter export gain credit access, we can loosely say that NBD reversals primarily reallocates credit from economically strong firms to economically weak firms.

Changes to Firm Production We now show how changes to market scales for domestic-only and export firms reflect the patterns of credit reallocation induced by the different banking development reversals.

Locally Specialized Development Reversal We saw that the LBD reversal induced a transfer of credit from financially weak firms to financially strong firms. Note that in Appendix Table A7 those firms that did not face credit rationing before the LBD reversal are generally able to increase market scale in all markets in which they operate. This effect is strongest for the export market. The decline in locally specialized monitoring efficiency increases the returns of the export market relative to the domestic market through changes to market-specific financing costs.

In contrast, firms that faced credit rationing before the shock generally see reductions to market scale for all markets in which they operate. The reduction in domestic inventory pledgeability hurts their already tenuous financial access, driving scale reductions for those firms that continue production in all their active markets. For many firms, the shock induces exit - either from the export market or from production altogether. Paradoxically, the LBD reversal also induces entry into the domestic and export markets for certain firms. By making finance more scarce, the LBD reversal weakens the relationship between firm performance and firm primitives and strengthens the relationship between firm performance and access to finance. As such, the

LBD reversal increases the competitiveness of weaker firms with good ex-post access to finance, facilitating their entry into domestic and export markets.

The opposite sign effects of the substitution and pledgeable income channels of a locally specialized financial shock imply that the LBD reversal generates an increase of 0.7% to export sales. Financially strong continuing exporters reap the benefits of a weaker financial environment and relatively higher returns to export over domestic production; however these gains are mitigated by the losses of financially weaker exporters. These exporters' previous export profile was supported by the stronger pledgeability of their domestic inventory assets; as such, a deterioration of locally specialized monitoring efficiency causes their export presence to decline.

Non-localistic Development Reversal We know that the NBD reversal reallocates credit from economically stronger firms (ex ante exporters) to economically weaker firms (ex ante domestic-only firms). The export-specific nature of this deterioration in credit conditions induces large decreases to export sales for virtually all classes of exporters, driving both reductions in export scale as well as exit from the export market altogether. All told, aggregate export sales decline by 3.4%. As part of this change to credit conditions, the relative attractiveness of domestic market investment increases due to the substitution effect; most, but not all export firms will increase their domestic scale as a result.

Domestic-only firms, on the other hand, reap the benefits of the worldwide weakening of export credit-access. In all, domestic sales increase by 1.2%.

D.3.2 Trade Shock vs. Financial Shock: Domestic Sales Shock Responses

Unlike the relationship of locally specialized banking to foreign sales, shocks to non-localistic banking density and variable costs of trade will always hurt domestic sales production (on average). Both induce substitution effects that favor exports sales over domestic. While both shocks can boost pledgeable income, neither will ever induce entry into the domestic market by assumption, as we have precluded the possibility of firms that only produce for the export market. This is also why both the trade shock and the non-localistic shock cannot generate negative effects on domestic sales like that of the locally specialized shock on foreign sales for larger firms - again, by assumption, they cannot induce exit from the domestic market.

Note that the locally specialized shock generates domestic sales responses for firms in the left tail of the size distribution that are much larger than the foreign sales responses generated by non-localistic shocks in the left tail. The mean firm size for infra-marginal domestic producers (post-entry) is likely to be smaller than the mean firm size for infra-marginal exporters (pre-entry), if only because infra-marginal exporters were sufficiently productive/had sufficient financial access to produce domestically in the pre-shock equilibrium and infra-marginal domestic producers were not. Since the distribution of infra-marginal exporters is already left skewed, this creates a denser concentration of infra-marginal domestic producers, creating the large peak in the left tail of the firm size distribution on the domestic sales localistic shock response plot.

E Appendix: Computation

E.1 Solution Scaling and Stability

Differences in variable magnitudes in multivariate optimization problems can adversely affect the performance of numerical solution algorithms. To combat this problem, we employ auxiliary functions in order to minimize the effects of poor scaling on algorithm performance. In particular, we define

$$\begin{aligned} b_m &= e^{-10*x_m} \\ E &= 100*y \end{aligned} \tag{37}$$

While this transformation increases the time it takes for numerical solvers to converge to a solution, the solutions generated are generally of higher quality and less prone to instability.

E.2 Choice of Solution Algorithm for NLP

When solving the constrained optimization program of each of our simulated firms, we use the MATLAB solver *fmincon* with its proprietary version of a **S**equential **Q**uadratic **P**rogramming algorithm. In describing its workings, we rely on Boggs and Tolle (1995).

Briefly, SQP attempts to solve a nonlinear programming problem (NLP) by replacing the NLP objective function with a sequence of second-order Taylor approximation of the Lagrangian functional of the NLP and the NLP constraints with their first-order Taylor approximation. Given an inital point x_0, SQP solves the so-called quadratic subproblem; that is, the quadratic approximation of the Lagrangian of the NLP centered about x_0. The solution to this subproblem is then used to center the next quadratic subproblem; the process repeats until convergence criterion is met.

SQP methods are generally heralded for its ability to accommodate the presence of nonlinear constraints; in particular, SQP does not require that the starting value for the algorithm or subsequent iterates be feasible with respect to constraints. Under assumptions that are satisfied by our NLP, the sequence of NLP solution iterates generated by SQP will converge to the local optimum so long as our NLP starting value is not too far from the true local optimum[4]; however, this latter point is crucial; although we are guaranteed the existence of a unique, global optimum given the assumptions on the underlying primitives, we are not necessarily guaranteed that SQP will converge to that optimum from just any starting point. As such, despite SQP's robustness to infeasible iterates, we will still need to take great care in generating appropriate starting values

4. Assumptions that guarantee convergence to some local optimum from a remote starting point are harder to establish. For more, refer to Boggs and Tolle (1995).

for our firm NLPs.

E.3 Generating Quality Start Values

E.3.1 Generating initial market price values

Our first task is to generate starting values for the firm's market price choice for each firm simulate θ. Given that we are solving a trade model with heterogeneous firms, the firm's optimal market price from a Melitz (2003)-like model without finance but with a probability of default is a natural place to start. As such, we set:

$$\hat{p}_m = \frac{\tau_m}{\varepsilon\varphi\gamma} \tag{38}$$

E.3.2 Generating initial market monitoring values

Given our guess for $\hat{p}_m$, we generate a guess for market-m monitoring by setting:

$$\hat{b}_m = 1 - \left(\frac{\beta_m(1+r)V(\hat{p}_m)}{\beta_m(1+r)V(\hat{p}_m) + (1-\gamma)I_m(\hat{p}_m)}\right)^{1/2}. \tag{39}$$

This is nothing more than the expression for the optimal choice of b_m in the unconstrained case evaluated at $\hat{p}_m$.

E.3.3 First solution attempt

Using the optimal prices from the Melitz (2003)-like model environment and the implied choices of monitoring as starting values for the firm's profit maximization problem when we ignore the incentive compatibility constraint, we solve:

$$\max_{p_m, x_m, y_m} \sum_m \{\gamma R_m + (1-\gamma)C_m - V(1+r)(1+\Psi)\} + rE \tag{40}$$

$$\text{subject to } p_m, b_m \in \mathbb{R}_+, E \in [0, W_i]$$

As this problem includes variable bounds, we use MATLAB's *fmincon* with the SQP algorithm.

E.3.4 Generating start values for fully-constrained problem

We will use the solutions to the above system to generate start values for the fully-constrained problem. However, firms whose unconstrained solution vector violates their incentive compatibility constraint present something of a challenge. Quality of numerical solutions to the fully-constrained NLP are contingent on the degree of closeness between the initial solution vector and the actual solution. Firms for whom the incentive compatibility constraint binds will have a non-zero lagrange multiplier, λ, associated with that constraint. Since market prices and monitoring levels are endogenous to λ, we are likely to get poorer quality solutions for firms with higher magnitudes of λ at the constrained solution when using the unconstrained solution vector as an initial solution vector.

Generating guess for degree of credit rationing With this in mind, consider the following optimization program, called the *semi-constrained* program for reasons that will become immediately apparent:

$$\max_{p_m, b_m} \sum_m \{\gamma R_m + (1-\gamma) b_m I_m\} - V(1+r)(1+\Psi) - \xi \sum_m (1-b_m) V_m \tag{41}$$

If $\xi = \frac{\lambda}{1+\lambda}$, then the solutions to the semi-constrained program will coincide with that of the fully-constrained program[5]. To see why, note that the first-order conditions for the above program are as follows:

$$\begin{aligned} p_m &= \frac{\tau_m}{\varepsilon \gamma \varphi}\Big[(1+r)(1+\Psi) + \xi(1-b_m) - (1-\gamma) b_m\Big] \\ b_m &= 1 - \left(\frac{\alpha_m (1+r) V}{\alpha_m (1+r) V + (1-\gamma+\xi) I_m + \xi F_m}\right)^{1/2}. \end{aligned} \tag{42}$$

Therefore, in order to obtain better starting guesses for (p_m, b_m) for the fully-constrained problem, we solve the semi-constrained program above by parameterizing ξ for each firm-draw. Let π and g be the value of the firm's objective function and diversionary benefits at the unconstrained

5. Since the optimal choice of E in the fully-constrained problem is a corner solution, we omit it from this program as its exclusion does not affect solution values.

solution, respectively; then, we specify our guess for $\xi = \frac{\lambda}{1+\lambda}$ as follows

$$\xi = \left(\mathbb{1}\left[\frac{g-\pi}{\pi} < 1\right] * \mathbb{1}[g-\pi > 0] * \frac{g-\pi}{\pi} + (1 - \mathbb{1}\left[\frac{g-\pi}{\pi} < 1\right]) * 1 \right)^{3/4} \tag{43}$$

Plainly speaking: we assign larger values of ξ to firms whose constraint violations at the unconstrained solution are larger. The power term 3/4 is used as we found that concave transformations of the relative constraint violation make for better guesses of ξ. Once we calculate ξ for each remaining firm-draw, we solve the semi-constrained program using the MATLAB solver *fmincon* under the SQP algorithm for each firm-draw.

E.3.5 Generating solutions to fully-constrained problem

Finally, we solve the fully-constrained program (i.e., including the incentive compatibility constraint) using the MATLAB solver *fmincon* with the SQP algorithm for all firm-draws.

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