TRADE, FINANCE & THE MACROECONOMY

By

Nicholas Rowe

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Economics – Doctor of Philosophy

2022

ABSTRACT

TRADE, FINANCE & THE MACROECONOMY

By

Nicholas Rowe

This paper investigates the effects of financial development on firm export when lenders specialize in lending against different borrower activities. Using Italian microdata on manufacturing firms, we document that financial development driven by locally-focused banks can boost export participation but can depress the export sales of incumbent exporters. We explain these patterns through an industry equilibrium model of international trade with heterogeneous firms and banks. Locally-focused financial development eases the entry of credit-rationed firms into export by increasing the pledgeability of their domestic inventory assets; however, it also induces credit-satiated exporters to partly redirect their production capacity to domestic markets. Model calibration reveals that when financial development is too local, increased domestic output and export participation can come at the cost of reduced aggregate exports.

JEL Classifications: E44, F4, G21, O16

Keywords: Financial Development, Internationalization, Banking Structure, Aggregate Trade Flows

Although I stand on the shoulders of giants,
I was borne on the backs of mentors, friends, and loved ones.

ACKNOWLEDGMENTS

To my primary advisor and mentor, Professor Raoul Minetti: You never gave up on me, even at those points when I had all but given up on myself; that I am here at all is due largely to your grace and guidance. I owe you a debt of gratitude I can never repay[1].

I am profoundly grateful to my dissertation committee for their advice and guidance over the years: Professor Luis de Araujo, Professor Susan Chun Zhu, and Professor Andrei Simonov. To Professor Qingqing Cao: thank you for your support and encouragement as my teaching supervisor! To Professor Pierluigi Murro: thank you for your help and patience as my co-author! I would also like to thank my undergraduate mentors, Professor Sahan Dissanayake, Dr. Olena Kostyshyna, Professor John Hall, and Professor Jamie Woods, who took me under their respective wings and initiated me into the field of economics.

I would like to thank my friends and collaborators, Professor Hannah Gabriel and Dr. Luke Watson: thank you for your friendship and support over the years. I look forward to our continued collaboration! I would like to especially thank Dr. Christian Cox. Your friendship and support has meant a lot to me throughout my graduate studies. You provided me with the computational foundations (among other things) that facilitated the execution of this dissertation. Thank you!

[1] This is somewhat fitting for a dissertation dealing with (among other things) financial frictions.

TABLE OF CONTENTS

LIST OF TABLES . . . viii

LIST OF FIGURES . . . ix

CHAPTER 1 INTRODUCTION . . . 1
1.1 Prior Literature . . . 4

CHAPTER 2 EMPIRICS . . . 8
2.1 Empirical Setting . . . 8
2.1.1 Institutional Background . . . 8
2.2 Firm-level Analysis . . . 10
2.2.1 Empirical Methodology . . . 10
2.2.2 Data and Measurement . . . 12
2.2.2.1 Export Activity Measures . . . 13
2.2.2.2 Local Banking Development Measures . . . 14
2.2.2.3 Control Variables . . . 15
2.2.3 Estimates . . . 15
2.2.3.1 Main Specifications . . . 15
2.2.3.2 Subsampling . . . 16
2.2.3.3 Effects by Localistic Branch Sub-type . . . 17
2.3 Province-level Analysis . . . 17
2.3.1 Empirical Methodology . . . 18
2.3.2 Data and Measurement . . . 18
2.3.2.1 Export Activity Measures . . . 18
2.3.2.2 Local Financial Environment Measures . . . 19
2.3.2.3 Price Indices . . . 19
2.3.2.4 Control Variables . . . 20
2.3.3 Estimates . . . 20

CHAPTER 3 THEORY . . . 23
3.1 Environment . . . 23
3.1.1 Economic Primitives . . . 23
3.1.2 Financial Environment . . . 24
3.1.3 Timing . . . 26
3.1.4 Monitoring Discussion . . . 26
3.1.4.1 The Dual Functions of Monitoring . . . 27
3.1.4.2 Separating Monitored Activity by Destination-Market . . . 28
3.2 Equilibrium . . . 29
3.2.1 Contract Equilibrium . . . 29
3.2.2 Industry Equilibrium . . . 30
3.3 Characterizing the Equilibrium . . . 31

3.3.1 Firm-Level Channels . . . 32
3.3.1.1 Pledgeable Income Effects . . . 32
3.3.1.2 Substitution Effects . . . 33
3.3.1.3 Competitive Effects . . . 34
3.3.2 Decomposing the Margins of Trade . . . 35

CHAPTER 4 CALIBRATION . . . 38
4.1 Model Calibration . . . 38
4.1.1 Overview . . . 38
4.1.2 Review of Main Channels . . . 40
4.2 Main Simulation Results . . . 42
4.2.1 Effects of a Localistic Shock . . . 42
4.2.1.1 Foreign Sales Response . . . 43
4.2.1.2 Domestic Sales Response . . . 45
4.2.2 Effects of Non-localistic Shock . . . 47
4.3 Macroeconomic Counterfactuals . . . 48
4.3.1 The Importance of Banking Structure . . . 49
4.3.1.1 Patterns of Credit Reallocation . . . 49
4.3.1.2 Changes to Firm Production . . . 50
4.3.2 Financial Shocks vs. Trade Shocks . . . 52
4.3.3 Discussion . . . 53

CHAPTER 5 CONCLUSION . . . 54
5.1 Policy Implications . . . 54
5.1.1 Public Credit Registry . . . 54
5.1.2 Trade Counterparty Data Collection . . . 54
5.2 Conclusion . . . 55

APPENDICES . . . 58
APPENDIX A APPENDIX - EMPIRICS . . . 59
APPENDIX B APPENDIX - THEORY . . . 70
APPENDIX C APPENDIX - CALIBRATION . . . 81

BIBLIOGRAPHY . . . 97

LIST OF TABLES

Table 1: Data sources and variable definitions . . . 59

Table 2: Firm-level Analysis: Summary Statistics . . . 60

Table 3: Baseline Specification - Extensive Margin . . . 61

Table 4: Baseline Specification - Intensive Margin . . . 62

Table 5: Subsampling . . . 63

Table 6: Alternative Specification . . . 64

Table 7: Province-level Analysis: Summary Statistics . . . 64

Table 8: Provincial Banking Environments and Export Intensity . . . 65

Table 9: Parameter Values . . . 81

Table 10: Moment-Matching . . . 82

Table 11: Shock-induced Changes in Key Real Variables . . . 83

Table 12: Change in Average Market Revenues by Firm Status . . . 84

Table 13: Change in Aggregate Market Revenues by Firm Status . . . 85

Table 14: Trade Margin Decomposition . . . 85

Table 15: Banking Development Reversals and Trade Shock Counterfactuals: Changes to Aggregate Revenue by Firm Status . . . 86

Table 16: Comparing Response Magnitudes: Trade Shocks vs. Financial Shocks . . . 87

LIST OF FIGURES

Figure 1:	Local Banking Development and Export Propensity	67
Figure 2:	Banking Development, Banking Structure and Export Activities (1997)	68
Figure 3:	Banking Development, Banking Structure and Export Activities (2010)	69
Figure 4:	Firm-Bank Loan Contracting Game: Extensive Form	71
Figure 5:	Effects of a 1% Increase in Localistic Banking Access on Aggr. Exports	88
Figure 6:	Heterogeneity in Continuing Exporters' Banking Access Elasticity of Exports	89
Figure 7:	Heterogeneity in Firm Credit Access Post a Re-regulatory Shock	90

CHAPTER 1

INTRODUCTION

Does finance help trade? In recent decades improvements in the depth and efficiency of the financial sector have been found to promote firms' internationalization. For example, more efficient banks can help firms finance the relevant fixed costs that entry into foreign markets entails as well as the variable costs associated with the expansion of their export scale (Manova (2013)). The banking sector is, however, highly heterogeneous in its composition and spatial distribution. While advancements in information technology have transformed the provision of finance, distance still matters for lending (Degryse and Ongena (2005)).

Since distance inhibits the ability of a lender to screen and monitor investment projects, variation in the distribution of financial service establishments across space can hinder capital mobility intra-nationally (Guiso et al. (2004)). Indeed, differences in relative access to lending and lenders' local expertise have been found to affect firms' ability to finance production for domestic markets as well as foreign. However, the utility of such local expertise will likely depend on the needs of the borrower. While the local branch of a regional bank may hold an edge over a multinational bank in screening and monitoring domestic activity, the reverse may be true where export activity is concerned. To see why consider the remarks made by one of the directors of the Bank of Italy in a public speech on local banks and firm internationalization: "... Overall, the phenomenon of the internationalization of Italian companies does not seem to have been intercepted, if not marginally, by the cooperative banks. The company that operates directly or indirectly abroad needs credit, guarantees to cover risks, consultancy, legal and commercial advice. To respond to these needs, banks must have relevant resources, specialist skills, professionalism, contacts and a wide range of products, characteristics that are found mainly in large [banking] organizations (Tarantola (2007))".

In light of these considerations, we ask: does local financial development always promote firm internationalization? More specifically, how do the size and composition of firms' local financial sector affect firms' export activity at the extensive and intensive margins? And, ultimately, how do they influence aggregate trade flows?

In order to underscore the salience of these questions, we first document empirically how firm export patterns vary with characteristics of their local financial sector. Our empirical setting is the period following a major deregulation shock - Italy's bank branching reform of the early 1990s - that led to a significant deepening of banks' presence in local banking markets. Using a detailed survey of manufacturing firms and information on their local banking markets (provinces), we provide motivational evidence that firm export entry and scale decisions are influenced by the composition of the local banking sector. We find that increased access to branches of banks with a local focus ("localistic" banks) is associated with increases in export participation for the firms most vulnerable to financial frictions. In contrast, the expansion of localistic banks appears to attenuate growth at the intensive margin of export for firms with stronger financial health. These effects contrast with those we estimate for the overall degree of financial development (deepening in the presence of all banks), which appears to boost firms' export participation to a lower extent but also to better preserve incumbent exporters' incentive to serve foreign markets.

Motivated by these empirical findings, we develop and calibrate a Melitz (2003)-style model of firm trade with financial frictions. In the model economy, firms pledge their sales revenue and inventory assets to secure external financing in the form of bank loans. Since firms can strategically default on their debt, the pledgeability of these resources is imperfect. Banks engage in costly monitoring of their borrowers in order to increase the liquidation value of pledged resources and deter strategic default - and so, "financial development" in this setting will come through innovations to monitoring efficiency. However, financial development is not monolithic here: a distinctive feature of our environment is that the pledgeability of the firm's resources - and by extension, the monitoring efficiency of its lender - is separable by destination-market of the pledged resources. Intuitively, a lender's efforts to repossess domestic finished inventory and find a buyer for domestic assets will be quite different than its efforts to do the same for finished inventory shipped overseas.

When financial development is allowed to vary in this way, we find that the effects of financial development on firm export activity will depend on the financial vulnerability of the firm in question and the type of financial development. Consider an improvement in banks' ability to monitor the domestic market ("localistic" financial development). An increase in the efficiency of "localistic" bank monitoring boosts firms' pledgeable resources, inducing financially-vulnerable firms to increase scale in all markets of operation and inducing others to increase the number of markets in which they operate. For exporters that do not lack for pledgeable income, the improvement in localistic monitoring only serves to reduce the relative costs of financing domestic scale. These firms will reallocate investment funds from the export market to the domestic market, chasing the now-relatively higher net return to investment.

While the above effects might seem counterintuitive - as noted, previous work in the literature has generally painted increased financial access as a panacea - they reflect competing substitution and income effects of a change in the availability of activity-specific finance. When bank monitoring of domestic activities becomes less costly, an exporter is affected in two ways: first, the cost of financing domestic operations becomes cheaper relative to export operations; second, its pledgeable income increases due to increased equilibrium monitoring of banks. For financially-healthy firms, the former effect dominates; for financially-vulnerable firms, the latter effect dominates. In order to determine which effect dominates in aggregate and its economic significance, we first calibrate our model so that selected moments of our firm microdata match the moments of our simulated industry and then perform trade and financial policy counterfactuals.

We find that an increase in localistic bank branch presence of an order of magnitude similar to that induced by the Italian bank deregulation[1] between 1990 and 1997 has a

[1]During the 1990-97 period, the regional density of (branches per population) of localistic banks in Italy increased by 40%+ annually and 55%+ for banks overall.

"democratizing" effect on firm participation in both markets, increasing the probability of producing for domestic and export markets by 0.9% and 0.5%, respectively. However, we also obtain that this "democratizing" effect comes at the expense of overall export production: the substitution effects on the intensive margin induced by the localistic financial development dominate the positive effects at the extensive margin, causing a 0.7% decrease overall to aggregate foreign sales. For comparison, the model predicts that an increase in the branch presence of all banks such as that induced by the bank deregulation between 1990 and 1997 boosts foreign sales by 3.5%. These figures highlight that one cannot abstract from the banking sector structure when gauging the impact of financial development on firms' internationalization and on aggregate trade flows.

1.1 Prior Literature

This paper contributes to the literature on the effects of financial markets on firms' international trade activity. Previous studies posit different sources of financial frictions: liquidity constraints prevent firms from paying export market entry costs (Caggese and Cuñat (2013), Chaney (2016)); imperfect contract enforcement reduces pledgeability of export sales (Manova (2013), Antràs and Foley (2015)); and informational asymmetries induce monopolistic banks to ration all firms (Feenstra et al. (2014)). Despite their relative differences, all predict that a lack of access to adequate external financing will reduce firms' export activity at both the extensive and intensive margins. These predictions are borne out by a veritable host of empirical inquiries (Beck (2003), Berman and Héricourt (2010), Bricongne et al. (2012), Chor and Manova (2012), Manova (2013), Minetti and Zhu (2011), Muûls (2015)) in a variety of different empirical settings. In particular, we contribute to the branch of this literature that examines how banking structures and changes thereto affect export activity (Amiti and Weinstein (2011),Bartoli et al. (2014), Chen et al. (2020), Iacovone et al. (2019), Paravisini et al. (2015), Xu (2022)). To our knowledge, ours is the first inquiry to show theoretically that banking development can discourage international trade.

The paper also contributes to the growing body of research focusing on banking specialization at the market and product/sectoral level. Recent authors have been able to leverage data on banks and their borrowers to press a more detailed case for the existence of regional/sectoral specializations by banks - typically measured by its relative exposure to a particular region/sector (Berger et al. (2017), Liberti et al. (2017), De Jonghe et al. (2020)). This strand of literature includes a recent subset of studies that focus on credit substitutability in the context of firm export activity (Caballero et al. (2018), Paravisini et al. (2015)). In our analysis, we provide theoretical foundations for the phenomenon of apparent imperfect substitutability between different sources of bank credit for export firms, and study its implications qualitatively and quantitatively in an industry equilibrium setting.

Finally, the paper contributes to the body of research studying the effects of local financial development on various economic phenomena - in particular, firm export activity. As noted, geospatial variation in the supply of financial services intra-nationally will keep capital from being perfectly mobile, even when international capital markets have been liberalized. Local financial development affects regional real activity through the relative ease through which individuals can access credit to participate in the domestic market (Guiso et al. (2004)) or a foreign market (Minetti and Zhu (2011); Grisorio and Lozzi (2012)). In our inquiry, we examine how the composition of the banking sector - namely, the types of banks local firms have access to - affects the ability of firms to participate in export at both the extensive and intensive margins.

The remainder of the analysis unfolds as follows. In Chapter 2, we present empirical evidence that motivates our quantitative analysis; Chapter 3 lays out the model that will be used to simulate policy experiments. In Chapter 4, we outline the stochastic structure of the model and the details of the calibration procedure. We divide the analysis and discussion of our simulation results into two parts: Section 4.2 details the main channels underlying the simulated effects of different financial shocks on extensive and intensive margins of trade; Section 4.3 presents the simulation results of counterfactual trade and financial policy changes and their macroeconomic implications. Chapter 5 concludes.

DISCLAIMER

This dissertation has been adapted for the purposes of submission to scholarly journals as the coauthored work, “When Does Finance Help Trade? Banking Structures, Export, & the Macroeconomy” with Raoul Minetti of Michigan State University and Pierluigi Murro of LUISS-Guido Carli University. They are primarily responsible for the firm-level analysis that appears in this Chapter. I have included this work with their permission.

CHAPTER 2

EMPIRICS

2.1 Empirical Setting

Late 20th-century Italy provides an ideal setting for investigating the effects of local financial development on the export behavior of manufacturing firms for three key reasons: first, bank credit has been, and continues to be, the predominant form of external financing for private firms in Italy; second, its banking regulatory infrastructure makes the identification of locally-focused banks very simple; and finally, it offers a well-established set of empirical proxies for shocks to local financial development. Since we use these proxies in our empirical analysis, it is worth briefly explaining their origins in greater detail.

2.1.1 Institutional Background

In 1936, Italy passed a sweeping banking legislation that restricted the path of its future financial development through two reforms: restrictions on the scope of financial services a single credit institution could provide to a customer; and restrictions on the geographic expansion of bank branch networks. Savings banks were permitted to expand within the regions they had already established themselves by 1936; by contrast, commercial banks and credit cooperatives were confined to the provinces in which they were already operating.[1] Finally, national banks could only expand in major cities. As detailed by Guiso et al. (2004), a province's degree of exposure to these restrictions is mostly a historical accident and is plausibly exogenous to the economic development of the province in 1936.

Beginning in the mid-1980s, Italy passed a series of structural reforms to its banking sector as a part of its economic integration into the European Economic Community.[2] In 1985,

[1]Provinces are local entities similar in size to U.S. counties (Minetti and Zhu (2011)).

[2]For a more thorough discussion of these reforms, refer to Girardone (2000).

it began removing the geographic restrictions on bank branching; by 1990, all geographic restrictions on bank branch expansion had been eliminated. In 1993, the government passed a law implementing the policies mandated by the EU's Second Banking Directive, which induced, among other things, increased entry into Italy's local banking markets by EU-member banks. The Second Banking Directive mandated: a) the removal of many of the restrictions on bank business lines created by the 1936 banking law through the reintroduction of universal banking; and b) the adoption of the principle of mutual recognition of EU member state banks' banking licenses.

As noted by Girardone (2000), Italy has traditionally highlighted the role of local banks in supporting local communities. For example, according to Donato Menichella (Governor of the Bank of Italy in 1948-60), small banks had a higher allocative efficiency due to better knowledge of local entrepreneurs and a better savings custody in a local environment. Figure 1 plots measures of local banking development in Italian provinces around the period of financial deregulation in the 1990s. The figures distinguish between the development of banking institutions with a local scope ("localistic"; credit cooperatives, popular banks, savings banks, and mutual and artisans' banks) and the development of all banking institutions operating in the province, including localistic banks and non-localistic ones (banks with at least a national focus). Figure 1 also plots measures of firm internationalization (export participation and value of export sales) during the same time frame.

The figures offer two broad impressions. First, there is wide heterogeneity across Italian provinces in terms of banking development, banking structure, and degree of internationalization. For example, the northern province of Trento and the southern Sicilian provinces exhibit a strong deepening of the presence of localistic banks, while they rank much lower in terms of overall development of all banking institutions. The opposite can be said for the southern provinces of Puglia and Calabria. These differences largely reflect the different impacts that the 1936 banking regulation had on these provinces. Second, while overall banking development in a province appears to correlate positively with firms' internationalization both at the extensive and intensive margins[3], a more nuanced picture emerges for localistic banking development.[4] The deepening of the presence of localistic banking institutions appears to positively correlate with firms' export participation but to correlate negatively with the intensive margin of export (value of export sales).

2.2 Firm-level Analysis

2.2.1 Empirical Methodology

We investigate the impact of local financial development on export decisions. We first examine the extensive margin of trade, that is, the probability of exporting. The probability that firm i exports can be written as

$$\mathrm{P}(Export_i = 1|B_i, Z_i) = \Phi\left(\alpha_1 + O_i\beta_1 + Z_i\gamma_1 + \varepsilon_{1i}\right), \tag{2.1}$$

where $\Phi(\cdot)$ is the standard normal cdf, B_i is a vector of measures of local banking development in the area (province) where firm i is located; Z_i is a vector of controls for firm characteristics that may affect firm i's export decision, as well as controls for regional differences; and ε_{1i} captures the unobserved firm attributes and any other unknown factor that may also affect the export decision.

We instead use the following specification to study the intensive margin of trade, i.e., the value of exports, conditional on exporting:

$$y_i = \alpha_2 + B_i\beta_2 + Z_i\gamma_2 + \varepsilon_{2i}, \tag{2.2}$$

where y_i is the logarithm of firm i's value of exports; ε_{2i} is the error term that captures the unobserved firm characteristics and any other unknown factor that may affect y_i; and all the independent variables are the same as in equation (2.1).

One might be concerned that firms' export propensity can trigger changes in local banking development, that is, the causality may be reversed. However, we have no reason to believe

[3] Panels (a) and (c) of Figures 2 and 3. In Figure 2, we show that the patterns are confirmed when considering export activities in the provinces roughly two decades later, in 2010.

[4] Panels (b) and (d) of Figures 2 and 3.

that shocks to the local supply of banking services, due to the bank deregulation process, are driven by firms' export propensity in the province. In addition, we control for a rich set of factors that may affect export decisions, including firm-level characteristics and area fixed effects. This should minimize the risk of omitting factors correlated with both banking development and export decisions. In spite of these considerations, it remains possible that there exist unobserved factors that simultaneously affect financial development and export. To assuage this possible concern, we complement OLS and Probit estimates with the approach proposed by Rajan and Zingales (1998) and adopted by Manova (2013) to help identify the impact of financial factors on firms' export: we test whether the impact of local banking development differs across firms with different external financial dependence for technological reasons.

As stressed by Manova (2013) for exports, in certain sectors firms need more external funding and have to sustain larger up-front costs for reasons solely related to the production process. Being driven by technological factors, external financial dependence is unlikely to be endogenous to the financial frictions faced by the firms. As a proxy of external financial dependence we use the measure from Rajan and Zingales (1998), who consider U.S. Compustat firms and capture the variation in sectoral financial dependence through the share of production costs that is not financed by internal cash flow. As pointed out by Rajan and Zingales (1998), what matters is the ranking of the financial dependence of the sectors. This ranking can be expected to reflect the technological features of the production process.

Moreover, to further address endogeneity concerns, we complement the non-instrumented estimates with an instrumental variable (IV) approach. Let I_p be a vector of instruments that are correlated with local banking development but affect export propensity only through the banking channel. The effect of these instruments on B_i is captured by β_4 in the local banking development equation

$$B_i = \beta_3 Z_i + \beta_4 I_i + \varepsilon_{3i} \tag{2.3}$$

where Z_i refers to the control variables, I_i is the vector of instruments, and ε_{3i} is the error term.

For the IV approach, we need an appropriate set of instruments. Following Guiso et al. (2004) and D'Onofrio et al. (2019), we exploit the above mentioned 1936 banking law which subjected the Italian banking system to strict regulation of bank entry until the 1990s. Guiso et al. (2004) demonstrate that the banking law deeply affected creation and location of new bank branches in the decades that followed 1936. Thus, we expect that the regulation shaped the local banking structure during the decades in which it was in place and that this affected the creation of bank branches in the years following the deregulation. Put differently, we expect the local tightness of the 1936 banking regulation to be correlated with our measures of local banking development during 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 hence the constrictiveness of regulation in a province, stem from "historical accident". Therefore, the regulation is unlikely to have had any direct impact on export activities during the 1990s.

We choose as instruments all the indicators that Guiso et al. (2004) employ to characterize the local structure of the banking system in 1936: the number of bank branches in the province (per 100,000 inhabitants), the number of local bank branches in the province (per 100,000 inhabitants), the number of mutual bank branches in the province (per 100,000 inhabitants), and the number of savings banks in the province (per 100,000 inhabituants).

2.2.2 Data and Measurement

Our main data source is the "Indagine sulle Imprese Manifatturiere", a survey carried out by the Italian bank Mediocredito Centrale. We use one wave of the Mediocredito survey, which covers a three-year period ending in 1997. The data set includes a representative sample of Italian manufacturing firms with 10 to 500 employees (95.5% of firms in the sample) and the universe of manufacturing firms with more than 500 employees. Overall, 4,490 firms were interviewed, which represent about 9% of the population in terms of employees and 10% in terms of value added.

The survey questionnaire covers information on firms' export activities, such as markets for the firm's products, the percentage of export in total sales, and details on the internationalization process; information on firms' characteristics, including demographics, management, workforce, and participation in groups and consortia; data on relationships with customers, suppliers and banks, and on sources of finance. The survey also contains balance sheet data from the BvD-AIDA database. Some of these variables are available for each year covered by the survey; some refer to the time of interview; others refer to the three-year period covered by the survey. To complement the survey, we employ data from the Bank of Italy on the presence of banks in local (provincial) markets. We use data from the Italian National Statistics Office (ISTAT) on the population of provinces. Finally, we employ the index of external financial dependence put forward by Rajan and Zingales (1998). Table 1 provides a comprehensive list of the variables used in our main firm-level empirical specifications and their sources.

Table 2 displays summary statistics. The firms are largely located in the North of Italy (70% of the total), while 17% of the firms are in the Center and 13% in the South. Considering Pavitt's taxonomy (Pavitt (1984)), the data show the predominance of businesses operating in traditional manufacturing sectors (41.8%). The portion of high-technology firms is relatively low (4.9%). The average firm size is medium (an average of 117 employees and a median of 33). At the average, the surveyed firms have been in business for 23.4 years, with a median of 19 years.

2.2.2.1 Export Activity Measures

The survey provides us data about whether a firm exported or not in 1997, and about the ratio of foreign sales to total sales if the firm exported. On average 66% of the firms in the sample exported. Conditional on exporting, the share of foreign sales in total sales equal 38.5%.[5] As shown in panel (c) of Figure 1, the propensity to export (the ratio between the

[5] On average foreign sales were 1.16 million euro.

number of exporters and the total number of firms) is higher in the North than in the Center or South.

The most popular export destination is the EU-15 (63.5% of the firms).[6] As for other markets, 11.6% of the firms export to Russia and Central-Eastern Europe, 11.7% to the United States and Canada, 8.5% to Asia excluding China, 2.4% to Africa, 1% to Oceania and China.

2.2.2.2 Local Banking Development Measures

To study the effects of local banking development on export, we exploit the Italian banking deregulation in the first years of the 1990s. Our strategy is to identify shocks to the local supply of banking services and the extent to which these shocks differ across types of banking institutions. In particular, we are interested in capturing the deepening of the presence of "localistic" banking institutions, that is, banking institutions with a local scope. Credit cooperatives, popular banks, savings banks, and mutual and artisans' banks all have local focuses in their lending practices; together, they constitute the category of localistic banks. To capture the deepening of their presence, we consider the annual percentage change of their branches in the province where the firm is headquartered. We impute this variable as the average in 1991–1997.[7] The mean growth of localistic bank branches in the provinces of surveyed firms was 4.4%. We also consider the development of all banking institutions operating in the province, including localistic banks (defined above) and non-localistic banks (banks with at least a national focus). We measure it through the annual percentage change of the branches of all banks in the province (again, averaged over the 1991–1997 period). The mean growth of all bank branches in the provinces of surveyed firms was 7.5%. To control for the initial level of banking development, we also use provincial data on the number of bank branches in 1991 (per 1,000 inhabitants).

[6] 29.9% of the firms export only in the EU.

[7] Over 1991-2001, the number of provinces rose from 95 to 103; for firms that declared themselves to be headquartered in new provinces, the data were imputed only for the years of existence of the new province.

2.2.2.3 Control Variables

We include a broad range of controls in the regressions. To account for the fact that older, larger, and more capital intensive firms are more likely to export (see, e.g., Bernard and Jensen (2004)), we include firm size (number of employees), age (years from the inception), and capital intensity (log of the fixed assets per worker). We also include dummy variables indicating whether a firm is a corporation, and whether it belongs to a consortium. A consortium may allow a firm to share the distribution network with other firms and thus reduce the cost for entering foreign markets. Moreover, we include industry (two-digit ATECO sector) dummy variables to account for other sources of comparative advantage and for the pattern of global demand for goods. Finally, we insert area dummies indicating whether a firm is headquartered in the South or Center of Italy (the main geographical areas of Italy differ substantially in infrastructures and institutions). The inclusion of area dummies is also useful because the North of Italy is closer to the EU markets where Italian firms mostly export.

2.2.3 Estimates

We first document the results of our exploratory empirical analysis using our main regression specifications. As we will see, our IV specification suffers from the problems of weak instruments, so we cannot claim to identify any causal effects with our empirical analysis. Since this analysis can therefore only be descriptive, we provide with reader with the results of alternative specifications as a robustness check.

2.2.3.1 Main Specifications

Table 3 shows the baseline estimates for the impact of (the various dimensions of) local financial development on export participation (the extensive margin); the results for export intensity are given in Table 4 (intensive margin). The results in columns 1-3 of Table 3 suggest that stronger overall financial development (increase in the presence of all banking institutions in local markets) promotes entry into export. Moving to column 4, where we insert the measures of financial development and their interactions with the Rajan and Zingales index, we see a clear pattern emerge. Localistic financial development appears to boost export participation, especially in sectors characterized by higher external financial dependence. The effect on export participation of non-localistic financial development instead appears to be less benign: stronger non-localistic development reduces export participation in more financially dependent sectors.

In Table 4 we turn to test the impact of local financial development on the intensive margin. The results point to a positive effect of overall financial development on a firm's export intensity (column 6).[8] However, this effect is heterogeneous across branch types: increases in provincial branch growth have a much smaller effect on export sales when that growth is driven by branching of localistic banks (column 7). Column 9 includes both financial development measures and their interactions with the Rajan and Zingales index. The estimates confirm the negative impact of localistic financial development on firm export sales, but also suggest that this negative impact is driven by firms that are less vulnerable to financial constraints (that is, in sectors with a lower value of the Rajan and Zingales index). Column 9 also confirms a positive impact of non-localistic financial development on the intensive margin of export. In column 10, we adopt an IV approach, instrumenting the measures of financial development with the 1936 indicators of tightness of bank regulation.[9] The IV estimates confirm the insights of column 9.

2.2.3.2 Subsampling

In Table 5, we repeat our analysis by subsampling firms according to two proxies for financial tensions: firms' leverage ratio and an indicator of credit rationing provided by the Mediocre-

[8] This conclusion is confirmed when we interact the measure of overall financial development with the Rajan and Zingales financial dependence index (see column 9).

[9] As it is typically the case, in the first stage we include also the instruments interacted with the Rajan and Zingales index.

dito survey.[10] A key result stands out. The negative effect of localistic financial development on the intensive export margin detected in Table 3 appears to be driven by firms that are less subject to financial tensions or constraints (that is, firms with lower leverage ratio - Panel A, columns 3-4 - and that declare not to be exposed to bank credit rationing - Panel B, columns 7-8).[11]

2.2.3.3 Effects by Localistic Branch Sub-type

As was mentioned earlier, credit cooperatives, popular banks, savings banks, and mutual and artisans' banks together comprise the category, "localistic banks". The reader may be curious to know if the effects documented thus far persist across all localistic banks or are driven by a particular subtype. Table 6 provides the truncated regression output for specifications of 2.1 and 2.2 that use the provincial branch density of each localistic subtype in the place of the broader localistic category. We find that the general dampening effect of localistic bank branch presence on firm internationalization indeed is present for all localistic bank subtype save mutual bank branches, whose coefficient is negative but not statistically significant.

2.3 Province-level Analysis

Given that our manufacturing microdata is only representative of firms with 10 or more employees, the reader may wonder whether the correlations we document persist when the entire universe of manufacturing firms is used instead. Therefore, we supplement our empirical analysis with alternative empirical specifications that seek to explain province-level manufacturing exports and manufacturing firm entry counts as a function of our main banking variables and other covariates.

[10]The survey asks the firms whether they were exposed to credit rationing by banks.
[11]No noteworthy differences among subsamples emerge for the extensive margin of export.

2.3.1 Empirical Methodology

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.

$$X_{pt} = F_{pt}\beta + Z_{pt}\gamma + \delta_t + \zeta_p + \eta_p * t + u_{pt} \tag{2.4}$$

Given large differences in economic and financial 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 2.4 to excise the spectre of endogeneity through ζ_p, then estimate the resultant differenced equation using provincial fixed effects to account for the province-specific slope η_p.

2.3.2 Data and Measurement

We construct a balanced panel of the economic and financial structure of the Italian provinces over the years 1997 through 2001 using data obtained through the Italian National Statistics Office, the Bank of Italy, and the Italian Union of Chambers of Commerce. Summary statistics for these measures are provided in Table 7. We walk through these measures and their sources in the discussion below.

2.3.2.1 Export Activity Measures

Our export activity measure is gross province-level nominal exports in euros, made available through the Bank of Italy. Since we are working with panel data, we will need to address the issue of inflation, which we discuss in the section on price indices below.

2.3.2.2 Local Financial Environment Measures

As detailed in Section 2, we use provincial counts of localistic and non-localistic bank branches obtained from the Bank of Italy to measure the depth and composition of a provincial banking sector. Here, we scale these counts by provincial population and take their natural logarithm. 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 try to capture provincial variation in the availability of non-bank finance.

2.3.2.3 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 - that is, a index of changes in the prices of predetermined basket of goods generated from establishment surveys (Silver (2009)). 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 - even over a short time-frame.

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 inflation. 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.

2.3.2.4 Control Variables

Information on provincial and regional macroeconomic aggregates is obtained through the Bank of Italy. In particular, GDP is available 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.

Provincial Industry Structure 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.

2.3.3 Estimates

Table 8 provides the point estimates for several varieties of empirical specification given in (2.4). As was mentioned before, we employ both first differences and provincial fixed effects to allow for province-specific random slope. Hereafter, when we speak of a variable, we are referring to its first difference.

In examining the results of our first specification, we see that our localistic bank branch measure has a economically and statistically significant negative coefficient. We can interpret this as indicating that a percentage-point increase in the growth rate of localistic 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 statistically significant. Interestingly, the coefficient on our logged GDP-less-exports per capita variable is negative. Faster growth in non-export areas of the economy requires use resources that might have otherwise gone to export-producing industries.

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. Somewhat unsurprisingly, the magnitudes of our banking variables decrease with the inclusion of the manufacturing fixed investment measure.

While the inclusion of the provincial nonfinancial corporation counts in our final specification reduces the magnitude of the coefficient on our localistic banking measure, the latter remains both 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 Table 7, 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.

A number of studies reviewing the performance of the Italian banking industry in the 1990s (see Angelini and Cetorelli (2003)) find both increases in consolidation and efficiency. We interpret these results 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 strongly positive and statistically significant at the 0.1% level. 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 Italian 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, save the coefficient on the natural log of working-age population. When we use the export UVI to deflate gross exports, we see a large decrease in the absolute magnitude of the coefficient on our localistic 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 localistic banking measure.

Despite the fact that the coefficient on our non-localistic banking measure was not statistically significant in our empirical specifications, we consistently reject the null hypothesis that its coefficient and the coefficient on the localistic banking measure are the same. All told, we continue to find a pattern of difference between localistic and non-localistic banking presences and their correlations with export growth.

CHAPTER 3

THEORY

We adapt the framework of Melitz (2003) for use in a symmetric, two-country industry context with a heterogeneous banking sector. After establishing the existence and uniqueness of the equilibrium, we preview the channels that characterize the effects of financial development on real activity. Then, we calibrate the full model for the purpose of performing comparative statics and policy counterfactuals.

3.1 Environment

3.1.1 Economic Primitives

Consumers have identical and homothetic preferences over a continuum Ω of varieties of industry good, domestic or foreign. Their utility from consumption reads

$$U = \mathbb{Q}_m = \left[\int_{i \in \Omega} q_{im}^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\sigma}{\sigma-1}} \tag{3.1}$$

where $\mathbb{Q}_m$ denotes aggregate consumption in market m on all final goods varieties q_{im}. Expenditures on a particular variety are given as

$$R_m = A\mathbb{P}_m^{\sigma-\eta} p_{im}^{1-\sigma}; \qquad \mathbb{P}_m = \left[\int_{i \in \Omega} p_{im}^{1-\sigma} di \right]^{\frac{1}{1-\sigma}} \tag{3.2}$$

where p_{im} is the price of firm variety i in market m, A is an exogenous demand shifter for industry goods, η is the industry price elasticity of demand and $\mathbb{P}$ is the price index for the industry.

Entrepreneurs produce sector-specific final goods using a single input, labor. By paying a sunk entry cost f_e, firms receive 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 the fixed costs F_d and F_x for the domestic and export markets. In order to begin producing for the domestic market, a firm must pay a fixed overhead cost of F_d. Similarly, in order to enter the export market, a firm must pay F_x, which captures entry/overhead costs associated with export. Accordingly, total costs for firm i are given as:

$$TC_i(q_m) = \sum_{m=1}^{2} \{q_m(\varphi) + F_m\}. \tag{3.3}$$

A firm can choose between two technologies: Good and Bad. The firm's production under the Good technology succeeds with probability $\gamma_g \in (0, 1)$; with probability $(1 - \gamma_g)$ production fails. When operating the Bad technology, firm production always fails (i.e., $\gamma_b = 0$[1]); however, use of the Bad technology allows the entrepreneur to divert firm production resources for her private benefits (more on this later). To begin production in any market, an entrepreneur must first pay fixed and variable costs of production. Each entrepreneur is endowed with an initial stock of liquid assets $W \geq 0$ out of which they may invest $E \leq W$ in their project; investment beyond this amount will require external finance.

3.1.2 Financial Environment

External finance is available to the entrepreneur by taking out a loan from any one of a number of identical, deep-pocketed banks in the entrepreneur's area. Banks can access infinite funds at interest rate r and compete to finance the entrepreneur. Since there is competition in lending, the entrepreneur can effectively make take-it-or-leave-it offers to their bank. Here, debt contracts are of the form $D = \{L, \{q_d + F_d, q_x + F_x\}, R_b, K\}$ where: L is the loan principal; $\{q_d, q_x\}$ a promised allocation of funds per active market; R_b the promised repayment; and K an allocation of collateral liquidation rights.

Production returns are not perfectly pledgeable - since an entrepreneur makes their technological choice after signing a debt contract, their bank cannot be sure that the entrepreneur will not strategically default (i.e., choose the Bad technology) to consume a private benefit. Following Burkart and Ellingsen (2004), we call this latter activity "diversion". To ameliorate the imperfect pledgeability of their production returns, the entrepreneur can choose to

[1]In light of $\gamma_b = 0$, we adopt the notation $\gamma_g = \gamma$ hereafter.

give the bank liquidation rights over its inventory assets if they fail to repay their loan. The lending bank is not a passive participant in the contractual arrangement: by monitoring the firm's market operations, the bank can recoup a fraction of the inventory value of the firm's goods in the event of default. Formally, a bank uses labor ℓ_m to monitor borrower activity in market m. If a borrower-firm i with a total investment V intends to invest $I_m \leq V$[2] in market-m inventory with failure risk $(1-\gamma)$, the bank can recoup a fraction $b_m \in [0,1)$ of the value of market-m inventory through use of the following technology:

$$\begin{aligned} b_m &= \frac{\sqrt{\ell_m^2 + 4V\beta_m\ell_m} - \ell_m}{2V\beta_m} \\ \Longrightarrow \ell_m &= V\beta_m\left(\frac{b_m^2}{1-b_m}\right) = V\psi_m. \end{aligned} \tag{3.4}$$

The term β_m here indexes the efficiency of the bank's market-m monitoring technology, providing the source of financial heterogeneity in this model environment. Financial development in this setting corresponds to improvements in monitoring efficiency. We will call improvements in monitoring that supports domestic sales "localistic" financial development and improvements in monitoring that supports foreign sales "non-localistic" financial development (alternatively, a (non)-localistic financial deepening). Since contracts are conditioned on the allocation of funds to each active market, the entrepreneur is restricted to diverting market-m funds using the market-m diversion technology. With this is mind, we see that bank monitoring also ameliorates the moral hazard problem. By monitoring a borrower's market activities, the bank can reduce the borrower's diversion payoff from strategic default. Specifically, the borrower's payoff from strategic default is given as:

$$\pi_{\text{diversion}} = \sum_m \{(1-b_m)\underbrace{(I_m + F_m)}_{V_m}\} - E. \tag{3.5}$$

We show in the Appendix that a firm must grant collateral liquidation rights to the bank in order to obtain a loan.[3] We further show that an entrepreneur will only ever receive a loan from its bank if the loan contract incentivizes the firm to choose the Good Technology;

[2] $V = \sum_m \{I_m + F_m\}$

[3] This is why we subtract off the equity investment term E.

this leads immediately to the entrepreneur's incentive compatibility constraint:

$$\gamma\left(\sum_m R_m - R_b\right) - E \geq \sum_m (1 - b_m)V_m - E. \tag{3.6}$$

Finally, we would like to remain agnostic about to whom the bank sells its liquidated collateral. We are not interested in this time in making claims about the share of industry output accounted for by liquidated collateral; more to the point, we have no data to substantiate any such claim. As such, we will explicitly assume that the bank consumes the liquidated inventory out of an abundance of caution.

3.1.3 Timing

The timing of the model can be summarized as follows (see also Figure 4):

1. The entrepreneur decides to export or produce solely for their domestic market
2. The entrepreneur offers their bank a debt contract D
3. The bank accepts or rejects the offered contract
4. The bank chooses monitoring labor (ℓ_d, ℓ_x) for each market
5. The entrepreneur chooses between the good and bad technologies
6. Nature draws a binary random variable from the appropriate conditional distribution implied by the entrepreneur's choice
7. Agent payoffs are realized

3.1.4 Monitoring Discussion

We take some time to explicate some aspects of monitoring that are distinctive of our environment. First, we explain the different functions of monitoring within a market; then, we discuss why monitoring efforts may be separable by the destination-market of monitoring production activity.

3.1.4.1 The Dual Functions of Monitoring

The liquidation value of a firm's pledged assets is determined jointly by the costs in successfully prosecuting the bank's collateral claim, the size of the bank's network of individuals/entities in the firm's pledged assets and the value they are willing to pay the bank for the assets. Developing a pool/network of potential buyers for repossessed assets requires knowledge of both the production technologies of the third party and the characteristics of the repossessed assets in order to successfully identify the surplus generated by a potential transaction. The more labor dedicated to these activities ex ante, the more likely a bank identifies a higher-surplus match ex post of default (Habib and Johnsen (1999)).

There are good reasons to believe that the efforts undertaken by a bank to maximize the liquidation value of the firm (the bank as a "collateral expert") also improve the bank's ability to detect and deter diversion (the bank as a "night watchman"). Usage of the Bad technology entails failure of the production process with certainty, a fact that will likely manifest in the quality of pledged collateral. Accordingly, it is reasonable to think that increased scrutiny by a loan officer increases the likelihood that the bank can liquidate the firm before more value is destroyed:

> " 'Common sense tells a lender that if you're making a secured loan, which is predominantly what most community banks make, you need to understand what the condition of the collateral is,' says Kent DeHart, senior vice president and SBA department manager 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.
>
> "In what sounds like a scene from Breaking Bad, the TV series about a chemistry-

> teacher-turned-meth-cook, DeHart arranged for a constable to accompany him to the site. 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, a practice he has emphasized at First Utah[4]."

It is with this in mind that we posit that activities that improve a lender's ability to liquidate pledged collateral also improve its ability to detect and thwart borrower diversion.

3.1.4.2 Separating Monitored Activity by Destination-Market

Collateral monitoring activities may require distinct, separate efforts based on the destination market of the pledged collateral. First, repossession of export finished inventory may require interacting with a different legal jurisdiction - accordingly, there may be distinct differences between preparing for repossessing firm assets located in the home country and firm assets located in the export market. Second, efforts to establish a ready market of buyers of repossessed assets likely require drawing from different pools of potential buyers depending on the destination market of repossessed assets. It may be advantageous to sell foreign collateral to a foreign buyer, but setting up the foreign buyer pool requires culling through a broader collection of potential foreign buyers.

Diversion monitoring activities will likely also look different in the case of borrower internationalization. To get an idea why, we provide an excerpt below from the Financial Action Task Force's "Trade-Based Money Laundering: Risk Indicators" to offer the reader an example of both (1) what reasoning/inference looks like in the context of monitoring generally and (2) how this reasoning/inference is complicated by the international context"

- "Contracts, invoices, or other trade documents display fees or prices that do not seem to be in line with commercial considerations, are inconsistent with

[4] Sears (2019)

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."
- "A trade entity lacks an online presence or the online presence suggests business activity inconsistent with the stated line of business, e.g. the website of a trade entity contains mainly boilerplate material taken from other websites or the website indicates a lack of knowledge regarding the particular product or industry in which the entity is trading." (FATF and Egmont Group (2021))

While money-laundering represents an extreme case of the types of activities that bank monitoring is intended to detect/deter, 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. The complexities of trade add additional layers of due diligence a bank must perform for its export clients in order to be assured of no wrongdoing. As such, we feel justified in separating export monitoring from domestic monitoring.

3.2 Equilibrium

3.2.1 Contract Equilibrium

We begin the equilibrium characterization with the following propositions:

Proposition 1. A unique subgame-perfect Nash equilibrium exists.

Proof given in the appendix.

Lemma 1. In the SPNE, the entrepreneur appropriates all surplus.

Proof given in the appendix.

With these in mind, the next result follows and will prove helpful in characterizing the equilibrium best-response functions:

Corollary 1. The SPNE allocation is constrained Pareto-efficient and can be obtained by solving the following maximization program:[5]

$$\begin{aligned}
&\max_{p_m,\ell_m,E} \sum_m \{\gamma R_m + (1-\gamma)C_m - V(1+r)(1+\Psi)\} + rE \\
&\text{subject to} \\
&\pi_e \geq \sum_m (1-b_m)V_m - E; \quad E \leq W.
\end{aligned} \tag{3.8}$$

Proof given in the appendix.

With firmer understanding of how the equilibrium looks like for the individual - local bank pair, we now consider aggregation.

3.2.2 Industry Equilibrium

An industry equilibrium is an industry price level $\mathbb{P}$ and a mass of firm entrants M_e such that:

[5]The following shorthand will be useful in what follows:

$$\begin{aligned}
&I_m = c\tau_m q_m; \quad \tau_d \equiv 1 \\
&V_m = I_m + F_m; \quad V = \sum_m V_m \\
&C_m = b_m I_m; \quad \Psi = \sum_m \psi_m
\end{aligned} \tag{3.7}$$

- Firms choose market prices p_m and banks choose the fraction of market-m inventory assets b_m to be liquidated to maximize their respective profits

- the firm choice p_m aggregates to $\mathbb{P}$; and

- the mass of entering firms is such that aggregate profit is equal to the aggregate cost of entry, i.e., $\Pi = M_e F_e$.

The first condition ensures that the individual choice of each agent is maximal with respect to their respective objective function; the second condition ensures that agents' maximal choices generate an industry price level that induces those best responses; the 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 Characterizing the Equilibrium

We are interested in the effects of financial development on export activity when we allow for heterogeneity in the local financial environment. For what follows, a "localistic financial deepening/shock" will refer to an increase in the efficiency of domestic monitoring; similarly a "non-localistic financial deepening/shock" will refer to an increase in the efficiency of export monitoring. Creating an environment in which these different types of shocks can be distinguished from one another comes at a cost: as the objective function is transcendental, we cannot obtain closed-form solutions for agents' best-responses.[6] We then calibrate the model and simulate an industry in order to perform counterfactuals. Before presenting the results in detail we will first build intuition for the underlying mechanisms.

[6]More precisely, it is generally not possible to obtain explicit solutions for the endogenous variables of the maximization program.

3.3.1 Firm-Level Channels

3.3.1.1 Pledgeable Income Effects

First, recall that financial heterogeneity in this economy comes from the term β_m, which indexes the market-m monitoring technology of a bank and is contained in the Ψ term in the below expression. In this problem, the incentive compatibility constraint captures the condition required to induce the firm to choose the Good Technology over the Bad Technology:

$$\overbrace{\sum_m \{\gamma R_m + (1-\gamma) b_m I_m\} - V(1+r)(1+\Psi) + rE}^{\text{entrepreneur's profits under Good tech.}} \geq \overbrace{\sum_m (1-b_m)V_m - E}^{\text{entrepreneur's profits under Bad tech.}}$$

We obtain the left-hand side of this condition by substituting the participation constraint of the lender (namely, that the lender at least breaks even in expectation) into the objective function of the firm. Recall that by Proposition 2, the entrepreneur will capture all the surplus - including the surplus generated through the bank's liquidation technology. Thus, their profits under the Good Technology comprise the following terms: (i) the expected sum of revenues from all the markets they participate in; (ii) the expected sum of all liquidation proceeds from all the markets they participate in; (iii) the negative of the total sum invested in both markets V, scaled by the bank's cost of funds $1+r$ and monitoring $1+\Psi$; and (iv) the financing charge the entrepreneur saves by investing their own liquid assets. The right-hand side of the condition captures the "profits" under the Bad technology. By investing their own funds E, the entrepreneur is able to induce the bank to offer the entrepreneur a loan. The "risk" to the entrepreneur under the Bad technology is the fact that they will allow the bank to liquidate their collateral - the value of which includes their original equity investment. Advantageous shocks to β_m will, all things being equal, increase the value of the left-hand side while decreasing the value of the right-hand side, functioning similarly to an increase in the firm's initial wealth endowment, W.

The incentive compatibility constraint has an additional interpretation for the bank.

Rearrangement of the constraint yields a second condition, which captures the condition required to induce the bank to lend to the firm - namely, that the firm's net expected pledgeable assets be large enough to ensure repayment of loan terms:

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

This expression also more clearly demonstrates the dual role of bank monitoring: its instrumentality in mitigating incentive problems (the bank as a "night watchman"); and its instrumentality in boosting the firm's total pledgeable resources (the bank as a "collateral expert").

3.3.1.2 Substitution Effects

The bank's influence extends beyond boosting the firm's effective wealth endowment. Consider the expression for a firm's optimal price in market m:

$$p_m = \frac{\tau_m}{\varepsilon\gamma\varphi} \overbrace{\left[(1+r)(1+\Psi) + \frac{\lambda}{1+\lambda}(1-b_m) - (1-\gamma)b_m\right]}^{\delta_m > 0} \tag{3.9}$$

where $\lambda \geq 0$ is the Lagrangian multiplier from the firm's incentive compatibility constraint. In a frictions-free environment, the firm prices at a constant markup over marginal cost. By construction, firms with higher productivity φ have a lower marginal cost and are therefore more competitive. Here, we see confirmation that financial frictions create a wedge between marginal revenue product and marginal cost. The term with λ is a "hazard premium" - it is the premium that must be earned per unit of output to ensure that the entrepreneur's claim on production returns is incentive-compatible. Clearly, changes in β_m (holding $\beta_{\neg m}$ constant) will generate changes to their relative market returns through the market monitoring term, b_m.

The term δ_m captures the effect of the firm's financial environment on the firm's activities in market m. It is immediately apparent that the level of financial development in the firm's locale will determine the magnitude of the wedge between marginal revenue product and marginal cost. Indeed, a firm's relative investment in one market over another is shaped by the influence of the bank monitoring b_m, whose expression is given below:

$$b_m = 1 - \left(\frac{\beta_m (1+r) V}{\beta_m (1+r) V + (1 - \gamma + \frac{\lambda}{1+\lambda}) I_m + \frac{\lambda}{1+\lambda} F_m} \right)^{-1/2}. \tag{3.10}$$

Monitoring in market m and production scale in market m are strategic complements; moreover, monitoring in market m and production scale in market n are strategic substitutes. This suggests that, under some conditions, improvements in market-m monitoring vis-Ã -vis reductions in α_m may induce a firm to substitute financing from market n to market m.

3.3.1.3 Competitive Effects

For the sake of simplicity, consider the expression for the industry price level 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 that are active in market m; M be the mass of active firms; finally, let $\mu_m = \varphi / \delta_m$. Hereafter, for reasons that will become apparent below, we will refer to μ_m as a firm's effective productivity in market m. Having clarified this notational difference, we can express the industry price level as a function of the firm entry mass and average effective productivity:

$$\mathbb{P} = M^{\frac{1}{1-\sigma}} \left[\int_{\Theta_e} p_d^{1-\sigma} dF_e(\theta) + \frac{\Pr(\mathrm{x})}{\Pr(\mathrm{e})} \int_{\Theta_x} p_x^{1-\sigma} dF_x(\theta) \right]^{\frac{1}{1-\sigma}} = M^{\frac{1}{1-\sigma}} p(\tilde{\mu}) = \frac{M^{\frac{1}{1-\sigma}}}{\varepsilon \gamma \tilde{\mu}}$$

where (3.11)

$$\tilde{\mu} = \left[\int_{\Theta_e} \left(\frac{\varphi}{\delta_d} \right)^{\sigma-1} dF_e(\theta) + \frac{\Pr(\mathrm{x})}{\Pr(\mathrm{e})} \int_{\Theta_x} \left(\frac{\varphi}{\tau_x \delta_x} \right)^{\sigma-1} dF_x(\theta) \right]^{\frac{1}{\sigma-1}}$$

We see that $\tilde{\mu}_d$ is a power mean[7] of a firm's productivity after accounting for the effects of its financial environment. When we express the industry price level this way, the likely implications of financial shocks on competitiveness become clearer. A positive shock to credit

[7] We omit it here, but μ_m may also be characterized as a weighted harmonic mean of firm effective productivity, similarly to Melitz (2003).

access - like an increase in bank access - increases $\tilde{\mu}_d$, primarily through reductions in δ_m. For firms that are sufficiently credit-rationed, the increase in credit access will outweigh the fiercer market environment vis-Ã -vis the reduction in $\mathbb{P}$, and sales will increase. For firms that already enjoyed easy credit access, the financial deepening causes their competitiveness deteriorate as $\mathbb{P}$ falls; hence, sales will decrease.

Heterogeneous Selection Pressures While changed selection pressures due to a change in financial access may be termed a competitive effect, there is nuance here that is worth underscoring. Different financial shocks may create different changes in selection pressures. There are two key facts that make a non-localistic financial deepening both qualitatively and quantitatively different from a localistic financial deepening.

First, the effects of a localistic financial deepening will be felt directly[8] and indirectly by all firms; the same is not true for a non-localistic financial deepening, which is only felt by export. In our simulations, being an exporter is generally associated with having higher productivity. Therefore, the likelihood of being able to derive greater benefits from a non-localistic financial shock will be correlated with variables that drove a firm's pre-shock success.

3.3.2 Decomposing the Margins of Trade

In a Melitz (2003)-style model, the change in aggregate exports ΔX following a shock are given by the following expression below. p_x refers to the probability of entering export, M_e refers to the entry mass of would-be firms, and $\mathbb{E}_{xt}[\cdot]$ is the expectation taken over the distribution of all firms for which export entry is optimal. Here, $t = 0$ refers to the pre-shock equilibrium and $t = 1$ refers to the post-shock equilibrium.

$$\Delta X = \Delta p_{xt}(M_{et}\mathbb{E}_{xt}[r_x]) \tag{3.12}$$

[8]By "directly", we mean the presence of nonzero substitution and pledgeable income effects; by "indirectly", we mean the reverberations of these effects as they manifest in changes to the industry price level and industry composition.

We are interested in characterizing how financial shocks of different types affect the intensive and extensive margins of trade. It will be convenient for us to partition the equilibrium set of active exporters between those we call incumbents, which export both before and after the shock, and those whose export participation depends upon the realization of the shock. We do so below:

$$\Delta X = \overbrace{\begin{pmatrix} p_C \Delta(\mathbb{E}_{Ct}[r_x] M_{et}) \\ \\ \end{pmatrix}}^{\text{continuing exp. change}} + \underbrace{\begin{pmatrix} \\ \Delta(p_{At}\mathbb{E}_{At}[r_x] M_{et}) \end{pmatrix}}_{\text{net entrant change}} \tag{3.13}$$

Here, the subscript C refers to exporters that continue exporting, post-shock; the subscript At refers to those firms that are active exporter only in equilibrium t. Note that the probability of being an incumbent exporter both pre- and post- shock does not change between equilibria by construction.

We define changes to the intensive margin of trade as the aggregate difference in foreign sales volumes of incumbent exporters. Changes to the extensive margin of trade come through two channels: changes to firm entry mass M_e and changes to the distribution of active exporters. By carefully adding zero, one can rearrange the above expression to obtain an expression for changes to aggregate exports in terms of changes to theses three quantities.

One could be concerned that a different choice of zero could yield a qualitatively similar decomposition with quantitatively different results. However, it turns out that there is little to be concerned with small enough shocks; our explanation may be found in Appendix D. With this in mind, we offer our decomposition below[9]:

$$\Delta X = \underbrace{p_C M_{e1} \Delta(\mathbb{E}_C[r_{xt}])}_{\text{intensive margin}} + \overbrace{\begin{pmatrix} p_C \mathbb{E}_C[r_{x0}] \Delta(M_{et}) \\ + p_{A0}\mathbb{E}_{A0}[r_{x0}]\Delta(M_{et}) \end{pmatrix}}^{\text{extensive margin: market size}} + \underbrace{M_{e1}\Delta(p_{At}\mathbb{E}_{At}[r_{xt}])}_{\substack{\text{extensive margin:} \\ \text{distribution shift}}} \tag{3.14}$$

[9]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.

As was noted above, for sufficiently small changes,

$$\Delta X \approx \underbrace{p_C M_{e1}\Delta(\mathbb{E}_C[r_{xt}])}_{\text{intensive margin}} + \underbrace{p_C \mathbb{E}_C[r_{x0}]\Delta(M_{et})}_{\text{extensive margin: market size}} + \underbrace{M_{e1}\Delta(p_{At}\mathbb{E}_{At}[r_{xt}])}_{\substack{\text{extensive margin:} \\ \text{distribution shift}}} \tag{3.15}$$

CHAPTER 4

CALIBRATION

4.1 Model Calibration

4.1.1 Overview

We calibrate the model to obtain parameter values informed by the "Indagine sulle Imprese Manifatturiere"survey data. To this end, we generate an industry of simulated firms, construct moments using the simulated data, and then match them to analogous moments of the survey data. First, we provide more details regarding the model and its stochastic structure; next, we outline the algorithm employed to match moments; we then present the benchmark calibration results and compare them to the results generated by conducting a comparative static. We note that, as our empirical moments are constructed from survey data that examine firms with ten or more employees, our benchmark calibration should be thought of as being representative of firms with ten or more employees.

Stochastic Structure For the purposes of this calibration, a "firm" is characterized by the vector θ, which consists of its productivity, initial wealth endowment, fixed costs for the domestic and export markets, and bank monitoring cost parameters for the domestic and export markets. Sources of variation in this model come at the firm level as well as the province level. Firm productivity, initial wealth endowment, and fixed cost shock comprise the former; the latter two consist of the firm's probability of technological failure and the bank's monitoring cost parameter.

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. Bearing this in mind, we assume that the marginal distributions for firm productivity, initial wealth endowment, and fixed cost draw are all distributed exponential, but have a joint multivariate distribution.

For simplicity, we assume that the copula describing the joint probability of a particular 3x1 draw is Gaussian. The pairwise correlation coefficients of these three random variables are parameters used to moment-match.

We construct an exogenous technological shock variable using data on provincial manufacturing firm dynamics 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 data from the Bank of Italy on the composition and depth of a province's banking sector in constructing bank monitoring cost parameters. Specifically, we assume that

$$\beta_{mp} = \left[\alpha_m * \frac{\#\text{ of type } m \text{ bank branches in province } p}{\text{thousands of persons in province } p}\right]^{-1} \tag{4.1}$$

Employing this assumption accomplishes two important ends: (i) it creates spatial variation in the depth and breadth of "local" financial access; and (ii) it functionally reduces the dimensionality of this model. If we did not make this assumption, generating financial heterogeneity in the model would require calibrating monitoring cost parameters for each province or region.

External Sources for Parameter Values We are able to generate values for three of our parameters from external sources. The values for the industry and goods demand elasticities are taken from Costantini and Melitz (2009) and the real interest rate is constructed using data on deposit rates from the Bank of Italy and inflation data from ISTAT (the Italian National Institute of Statistics). The remaining parameter values are obtained through the moment-matching procedure.

Convergence to Industry Equilibrium Given some candidate parameter vector θ, we initialize the algorithm by providing guesses $(M_e^0, \mathbb{P}_0)$ for the mass of firm entrants and the industry price level, respectively; 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 for the industry equilibrium variables. The process is repeated until the distance between successive $(M_e^k, \mathbb{P}_k)$ satisfies a convergence criterion.

$$\begin{aligned} M_{e,k+1} &= M_{e,k}\left(1+\zeta * \frac{F(\theta \in \Theta_d)\mathbb{E}[\pi(\mathbb{P}_k, M_{e,k})|\theta \in \Theta_d]}{F_e}\right) \\ \mathbb{P}_{k+1} &= M_{e,k+1}^{\frac{1}{1-\sigma}}\left[\sum_m \{\Pr_k(q_m > 0)\int_{\Theta_{m,k}} p_{m,k}(\theta)^{1-\sigma} dF_{m,k}(\theta)\}\right]^{\frac{1}{1-\sigma}} \end{aligned} \tag{4.2}$$

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 Gausss-Seidel algorithm), we employ the dampening[1] term $\zeta \in (0,1)$ when generating the M_e^{k+1} iterate to improve algorithm stability.

4.1.2 Review of Main Channels

Before moving on to the results, it is helpful here to recount the mechanisms we expect to see at work in our simulations. Recall the entrepreneur's optimal price charged for output destined for market m:

$$p_m(\mu_m) = \frac{\tau_m}{\gamma\varepsilon\varphi}\left[(1+r)(1+\overbrace{\Psi}^{\sum_m \psi_m(b_m)}) - (1-\gamma)b_m + \underbrace{\frac{\lambda}{1+\lambda}(1-b_m)}_{\text{hazard premium}}\right] \tag{4.3}$$

Substitution Effect: Increased access to bank monitoring in market m (by way of a financial shock) will induce an entrepreneur to increase scale in market m. Increases in market-m production scale beget increased monitoring in m-type monitoring and decreased $\neg m$-type monitoring. These changes beget further shifts in the entrepreneur's market production portfolio towards market m and away from market $\neg m$.

[1]As noted by Judd (1998), when the solutions generated by a fixed-point iteration of the general form $x_{k+1} = f(x_k)$ are unstable, employing dampening - that is, choosing $\zeta \in (0,1)$ and using instead the modified transition rule $x_{k+1} = \alpha f(x_k) + (1-\alpha)x_k$ - can lead to improved stability.

Pledgeable Income Effect: Increased access to bank monitoring of either type (by way of a financial shock) will increase the entrepreneur's pledgeable income at every level of investment in all markets. This manifests both through (i) a reduction in the entrepreneur's hazard premium and (ii) a general reduction in the costliness of financing, i.e., the direct effects of the reduction of the magnitude of α_m on price in either market. These effects induce increased investment in all markets in which the entrepreneur is active. The more the entrepreneur lacks for pledgeable income (the higher λ is), the more the pledgeable income effect tends to outweigh the substitution effect.

Competition Effects: The changes described above induce changes in market structure. Broadly, increases in access to loanable funds shift the industry supply outwards, driving the industry price level down. 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[2]

$$\begin{aligned}\frac{\hat{r}_m(\hat{\mu}_m)}{r_m(\mu_m)} &= \left(\frac{M_m}{\hat{M}_m}\right)^{\frac{\sigma-\eta}{\sigma-1}} \left(\frac{\tilde{\mu}_m}{\hat{\tilde{\mu}}_m}\right)^{\sigma-\eta} \left(\frac{\hat{\delta}_m}{\delta_m}\right)^{\sigma-1} \\ \implies g_r^m &\approx -(\sigma-1)g_\delta^m - \left(\frac{\sigma-\eta}{\sigma-1}\right)g_M^m - (\sigma-\eta)g_\mu^m.\end{aligned} \tag{4.4}$$

In order for a firm to do better in market m following a positive shock to either localistic or non-localistic financial deepening, two things must hold. First, the shock must induce an improvement in market-m financial access - a fall in δ_m - through the combination of the firm's substitution and pledgeable income effects. Second, it must be the case that the firm's gains in financial access (g_δ^m) are, loosely speaking, strictly larger than the market gains in size (g_M^m) and average effective productivity (g_μ^m). Therefore, financial deepening will generally help more heavily-rationed incumbents and generally hurt credit-satiated incumbents.

[2] This expression utilizes the formulation for industry price given in (3.11). g_x represents the percentage growth in variable x; M_m represents the mass of firms active in market m; δ_m represents a firm's relative access to finance (including market-m monitoring); μ_m represents effective market-m productivity; and $\tilde{\mu}_m$ represents the industry average thereof.

4.2 Main Simulation Results

We are interested in investigating how our simulated industry responds to differing types of financial development. As a benchmark, we calibrate the model's parameters so that moments from our simulated industry resemble moments from the data. Next, we perform counterfactuals by increasing the branch density for banks of a particular type by 1% and examining the resultant equilibrium. We remind the reader that bank branch density of the localistic and non-localistic varieties indexes the monitoring efficiency parameter for our simulated firms and is the source of financial heterogeneity in this model.

We use three distinctions to divide firms into five relevant states: whether the firm is active; whether the firm produces for the export market; and whether the firm faces credit rationing. "Inactive" is one such state; active firms are classified according to their export and credit-rationing status. We therefore organize simulation results in the form of a transition matrix, where the x-axis separates firms by their state before the shock and the y-axis separates firms according to their state after the shock. Hereafter, we will refer to such groupings as *transition classes*.

Beyond facilitating a richer interpretation of the effects of different financial shocks on credit rationing and export entry, separating the firms by transition class will also allow us to more cleanly characterize the best-response behavior of firms. When firms change credit rationing or export status, their value function encounters a kink; as such, their best-response functions will not be differentiable (or continuous, in the case of changing export status).

4.2.1 Effects of a Localistic Shock

We begin the analysis of our results by investigating the effects of a 1% increase to localistic banking density (LBD) on foreign and domestic sales activity.

4.2.1.1 Foreign Sales Response

In order to build confidence with our tools of analysis, we direct our reader to Table 12 and Figure 5. The top-right quadrant of Table 12 provides a breakdown of how average sales change following a 1% increase to localistic banking density for each firm transition class. Figure 5 displays the change to aggregate exports and decomposes these changes into the intensive and extensive margins. The diagonals on tables referenced in this section provide the changes to aggregate sales for those firms whose export and credit rationing status remained unchanged after the financial shock. We will therefore focus on these firms when characterizing the intensive margin.

Intensive Margin Response The top table in Figure 5 provides the change in aggregate trade at the intensive margin of those firms that export both before and after a 1% increase in localistic banking access. The units are basis point changes from total aggregate foreign sales in the pre-shock equilibrium.

Since access to localistic bank branches improves monitoring efficiency for the Home market, the substitution effect of this shock will tend to decrease foreign sales. Indeed, we see that incumbent exporters that are credit-satiated before and after the shock reduce their foreign sales by an amount equivalent to 1.6 basis points of total pre-shock trade. Recall that we suggested that the incentive compatibility constraint could be alternatively called the pledgeable income constraint. 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 be see in the plot of individual firm-draws' localistic banking access elasticities of exports in Figure 6(a). The credit-satiated exporters mentioned earlier comprise the dark, navy-blue region at the bottom right of the plot. Since they had sufficient financial access to be credit-satiated in the pre-shock equilibrium, (i.e., lower degrees of market-specific constrainedness), additional increases in financial access cannot improve their relative export market performance. Thus, exports for these firms decline.

In contrast, those continuing exporters that are credit-rationed both before and after the shock increase their foreign sales by an amount equivalent to 0.2 basis points of total pre-shock trade. We can find these exporters in the upper-right of Figure 6(a). Since these exporters are, by definition, constrained by pledgeable income, the pledgeable income effect "bites" here. Credit-rationed exporters are able to use the improved pledgeability of their domestic assets to underwrite increased investment in foreign sales; as it turns out, the pledgeable income effect is large enough to dominate the substitution and competitive effects of the financial shock.[3]

Extensive Margins Changes to the extensive margins of trade are driven by changes in the measure of firm entrants M_e and changes to the relative measure Pr(x) and distribution $F_x(\theta)$ of active exporters. Recall the free-entry equilibrium condition:

$$\begin{aligned}
f_e =& \mathrm{Pr(e)} \int_{\Theta_e} \pi(\mathbb{P}, \theta) dF(\theta) \\
f_e =& \mathrm{Pr(e)} \int_{\Theta_e} \pi\big(M_e^{\frac{1}{1-\sigma}} p(\tilde{\mu}), \theta\big) dF_e(\theta) \\
f_e =& \mathrm{Pr(e)} \int_{\Theta_e} \pi_d\big(M_e^{\frac{1}{1-\sigma}} p(\tilde{\mu}), \theta\big) dF_e(\theta) + \mathrm{Pr(x)} \int_{\Theta_x} \pi_x\big(M_e^{\frac{1}{1-\sigma}} p(\tilde{\mu}), \theta\big) dF_x(\theta),
\end{aligned} \tag{4.5}$$

where Pr(e) and Pr(x) are the probabilities of producing for the domestic and foreign markets, respectively.

Changes to Distribution of Active Exporters Fundamentally, increases to localisic banking access boost the pledgeability of domestic inventories. This both enables increased investment in all markets where investment is feasible while slightly increasing the attractiveness of domestic production relative to export production, shifting the boundaries of the set of active exporters. For most firms affected by this boundary shift, the pledgeable income

[3]The off-diagonals of the top table in Figure 5 refer to firms whose credit-rationing status changes while remaining an exporter. The exporters that lose credit-rationing status after the shock generally have higher productivities that those that become rationed post-shock. General improvements in localistic banking access enable all firms to compete more fiercely. For less-productive firms with better credit access pre-shock, this adversely affects their market position.

effect dominates; the boost the localistic financial shock provides their pledgeable income allows these "entering" exporters to reach market scales that make export entry optimal. For a much smaller number of firms, the substitution effect dominates. These "exiting" exporters typically have higher domestic fixed costs than the entering exporters and even higher export fixed costs. For these firms, it actually makes more sense to switch to domestic-only production to get the full benefit of lowering monitoring costs.

When all is accounted for, the localistic financial shock increases the probability of export entry by 1.85 basis points, democratizing export participation by making export more profitable for a large measure of firms. These new entrants account for a 1.55 basis point increase in aggregate trade.

Changes to the Mass of Entrants The combination of increased entry and increased effective productivity $\tilde{\mu}$ generates a sizable decrease in the industry price level $\mathbb{P}$ - so large, in fact, that it actually drives expected profits conditional on entry below the fixed entry cost. In order to satisfy the free entry condition, the firm entry mass must decrease slightly, causing aggregate trade to decrease by 1.79 basis points over the benchmark calibration.

Thus, localistic banking development has two countervailing effects on the extensive margin of trade. First, a distributional effect. Localistic banking development democratizes export production by making it profitable for a broader measure of firms. Second, by facilitating greater competition and driving expected profits lower, localistic banking development dampens entry pressure through reduction to the entry mass of firms. These two effects roughly cancel each other out, with the market size effects slightly dominating the exporter distribution changes.

4.2.1.2 Domestic Sales Response

We can now examine the effects of a localistic shock on domestic sales, whose results are shown in the upper-left of the top panel of Table 12. Since localistic monitoring supports domestic activity, the substitution effect here tends to increase domestic sales. We again start with the diagonal: we see that rationed domestic-only firms' average sales has the strongest response, followed by rationed exporters. Since both classes of firm are rationed, they will have a strictly positive pledgeable income effect, in contrast to the credit-satiated firms. However, of the two, the rationed exporters' pledgeable income effect is diffused across both the domestic and foreign markets, reducing its potency where the domestic market is concerned.

The substitution effect alone is not sufficient to increase domestic sales for credit-satiated firms. As they had sufficient financial access to meet all credit needs in the pre-shock equilibrium, their comparatively smaller gains in effective productivity are outpaced by the gains of rationed firms. Since their position in the pre-shock equilibrium was partly due to their superior financial access, their domestic performance declines in an equilibrium with greater financial access.

Table 14 condenses the trade margin decomposition displayed in Figure 5 and extends the decomposition of the effects of the localistic shock in both markets. We see that localistic financial deepenings nevertheless increase the likelihood that an industry entrant will produce for both the domestic and foreign markets. Note that the localistic shock contributes positively to aggregate sales in both markets through expanding the distribution of active firms and exporters. In a sense, a localistic financial deepening "democratizes" the industry. Bearing this in mind, the upper-right and bottom left submatrices of the bottom panel of Table 13 show the impact of a localistic financial deepening on aggregate domestic sales. We see that while a domestic financial deepening decreases domestic sales for those domestic-only firms that enter export or exit production activities altogether, these effects are dominated by the increases to aggregate domestic sales due to firms entering production.

4.2.2 Effects of Non-localistic Shock

When we think of a shock to non-localistic banking density (NBD), it is important to remember that we are considering a non-localistic financial shock in a symmetric, two-country world. For example, we can think of this as a shock that allows a bank like Santander or Unicredit to increase bank branch density in both Italy and Germany. Of course, the 1990s deregulation in Italy represented such a shock, as member nations of what would be called the EU Common Market all adopted the principle of mutual recognition of the foreign bank branches of other member nations. In any case, it is important to remember for the subsequent discussion that in this environment, Foreign's exporters are affected as well.

The mechanics of the effects of a non-localistic shock on the economy are analogous to that of the localistic shock, with two critical exceptions: first, the substitution effects now encourages export; second, in order to realize the direct benefits of the shock, one must be an exporter or an inframarginal exporter. Localistic financial deepenings increase financial access for any firm. Non-localistic deepenings increase financial access for those firms that are already more likely to be more productive and more profitable. It is these differences that drives the seemingly paradoxical changes in selection profiles we see. The localistic financial deepening makes it easier for smaller/weaker/less productive firms to compete with larger/stronger more productive firms; it mitigates existing interfirm inequalities. By contrast, a non-localistic financial deepening increases interfirm inequalities.

As is seen in the bottom-left of the upper panel of Table 12, a non-localistic financial deepening increases average foreign sales for both credit-satiated and credit-rationed exporters First, both credit-satiated and credit-rationed exporters benefit from the fact that the substitution effect now favors export; second, as in the case with a localistic shock, the presence of a non-zero pledgeable income effect for credit-rationed exporters increases their foreign sales response relative to that of the credit-satiated exporters.[4]

[4]The bottom-right of the upper panel of Table 12 shows the response of domestic sales to a non-localistic shock. We only need touch upon the fact that both credit-satiated and credit-rationed domestic-only firms' domestic sales fall following the non-localistic financial shock. Both classes of firms are not exporting; there-

The bottom section of Table 11 shows how the localistic and non-localistic financial deepening induce changes to the distribution of active firms. The qualitative difference in the induced changes is stark: a localistic financial deepening broadens the distribution of active firms; a non-localistic financial deepening narrows it. More precisely: the measure of firms over the joint probability distribution of model primitives that can produce profitably increases following a localistic financial deepening; it decreases following a non-localistic financial deepening.

This should not be surprising. Symmetric, positive shocks to non-localistic financial access in this model are analogous to reductions in net trade barriers in a work-horse model of heterogeneous firms in international trade. Reductions in trade barriers make export more profitable for existing exporters and optimal for infra-marginal exporters; however, this increase in gross trade exposes the remaining domestic-only firms to fiercer import competition, driving exit (Melitz (2003)). The same is true of improvements in non-localistic financial access.

4.3 Macroeconomic Counterfactuals

This section investigates the quantitative distinctions between different types of financial deepening and their overall economic significance in two ways: first, we perform experiments that, in a broad sense, "re-regulate" the Italian banking sector by reversing the growth in bank branch densities experienced from 1990 to 1997; second we perform an experiment that allow us to re-state the effects sizes of our original experiments relative to the effect size magnitudes of a trade liberalization.

fore, a non-localistic shock has no direct bearing upon them, either through the substitution or pledgeable income effects. Foreign's exporters, having been helped by a non-localistic financial shock in Foreign, have greater access to non-localistic monitoring and can now export more competitively. Thus, the domestic-only firms in both Home and Foreign face greater export competition without receiving any greater financial access; thus, their sales drop.

4.3.1 The Importance of Banking Structure

From 1990 to 1997, the number of localistic bank branches in Italy increased by over 40%; non-localistic bank branches increased by more than 75%. In order to assess how changes to the Italian banking structure affect firm internationalization activity, we perform separate experiments in which the provincial number of localistic and non-localistic bank branches are decreased from the 1997 benchmark experiment levels by 28.6% and 42.9%, respectively. In order to effectively show how heterogeneity in the structure of banking development can beget heterogeneity in firm internationalization activity, we will first show how reversals in localistic/non-localistic banking development generate different distributions of changes to credit access; then, we will map these changes into firms' export responses.

We will also take this opportunity to remind the reader of our assumptions in this industry equilibrium setting: banks are deep-pocketed, with access to an infinitely elastic supply of funds at interest rate r; further, these banks consume any collateralized inventory in the event of a borrower default. By assuming that the banking sector is unconstrained in its access to loanable funds, we can focus on and isolate the effects of changes in the mix and efficiency of provincial banking specializations on firm export activity. In assuming that banks consume the collateralized inventory, we can be sure that any financial shock-induced changes to industry export aggregates are solely driven by their effects on firm export activity.

4.3.1.1 Patterns of Credit Reallocation

Figure 7 shows how LBD and NBD reversals generate starkly different distributions of credit access responses. Broadly, the LBD reversal causes a general deterioration of localistic inventory pledgeability, hurting all firms; this general weakening of industry competition then benefits firms with better ex-post access to localistic monitoring. For these firms, their credit access improves - the LBD reversal has redistributed credit from the financially vulnerable to the financially strong.

In contrast, the NBD reversal reallocates credit from the economically strong to economically weak firms. NBD reversals reduce the non-localistic monitoring access of firms that were strong enough to enter export in the first place, generating sizable loses in credit access. Since this shock is symmetric, this creates a weakening of export competitiveness worldwide - and by extension, a weakening of import competitiveness. This improves the relative market position of domestic-only firms, making them more profitable and improving their credit access.

4.3.1.2 Changes to Firm Production

Tables 11 and 15 show that changes to market scales for domestic-only and export firms broadly reflect the patterns of credit reallocation induced by the different banking development reversals.

Localistic Banking Development Reversal We saw in the last section that the LBD reversal effected a transfer of credit from financially weak firms to financially strong firms. Note that in Table 15 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 localistic monitoring efficiency increases the returns 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 ex ante to the shock. 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.

Since the substitution and pledgeable income effects of a localistic financial shock have opposite sign effects on exports, the LBD reversal generate a modest yet sizable increase of 0.7% to exports 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 experienced by financially weaker exporters. These exporters' previous export profile was supported by the stronger pledgeability of their domestic inventory assets; as such, a deterioration of localistic monitoring efficiency causes their export presence to similarly deteriorate.

Non-localistic Banking 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 condition induces large decreases to exports 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 reap the benefits of the worldwide weakening of export credit-access; virtually all domestic-only firms will be able to increase their domestic production scale. In fact, 0.3% of this increase to domestic sales comes through the entrance of previously inactive firms who are now able to product profitably given the weakening of import competition. In all, domestic sales increase by 1.2%.

4.3.2 Financial Shocks vs. Trade Shocks

Without a comparison point, it is difficult to make statements about economic significance of different types of financial development on trade. With this in mind, we perform an additional numerical experiment in which we reduce net trade barriers by 1% to allow us to more confidently draw conclusions about the economic significance of the effect sizes. To achieve this, Table 16 re-presents the summary statistics (Table 11) of the experiments from section 5 as a percentage of the magnitude of the analogous statistics from the 1% trade barrier reduction experiment. For instance, the effect of a 1% increase in localistic banking density on total sales represents approximately 15.8% of the effect size on total sales induced by a 1% reduction in net trade barriers.

Since non-localistic monitoring in this environment directly supports trade, it provides a natural place to start examining relative effect sizes. Indeed, we see that the signs of the responses of economic variables to a 1% increase in non-localistic banking density comport with their trade barrier shock counterparts. Most all of the non-localistic shock responses of economic variables are within an order of magnitude of the corresponding trade barrier shock responses. In particular, note that the effects of a 1% increase in non-localistic banking density on domestic sales and foreign sales are 11.0% and 10.7% of the magnitudes of their corresponding trade-barrier-reduction effects, respectively. The resemblance is even stronger for the change in the probability of being an exporter, with its respective effect sizes representing 19.0% of the magnitude of their trade-barrier counterparts. All told, the non-localistic shock responses of economic variables bear a fairly strong resemblance to the corresponding trade-barrier shock responses, with magnitudes varying between 5.9% and 28.8% of their trade barrier analogues.

The localistic shock response magnitudes are more varied. Relative response magnitudes of economic variables range from -32.7% (change to the probability of entering the domestic market) to 59.2% (change to aggregate employment). Given the structural differences between localistic and non-localistic banking in this environment, this result comes as no surprise. We note that the effect size of the localistic shock on foreign sales is -3.1% of the magnitude of the corresponding trade barrier shock responses.

4.3.3 Discussion

The foregoing effect sizes, while not overwhelming, are nevertheless sizable when viewed in light of the fact that the supply of loanable funds in this environment is infinitely elastic by assumption. Moreover, given that the shocks we generated were symmetric, i.e., shocks for both Home and Foreign, the effect sizes generated are smaller than those that would prevail following a unilateral policy shock. Our results suggest that financial development policy represents fruitful ground for a government looking to boost its country's export competitiveness unilaterally without starting a costly trade war.

Of course, by Corollary 1, the contractual allocations between a firm and bank in our environment are at least constrained Pareto efficient. Therefore, any welfare-improving financial policy interventions implied by our framework must come through changes to the structural parameters governing the efficiency of monitoring. Bearing this in mind, we believe a good place to start is with interventions that help make information on borrowers and their potential foreign counterparties less costly to obtain/easier to access. We discuss in Appendix C the creation of a public credit registry and a repository of foreign counterparties in international trade and how they meet these criteria.

CHAPTER 5

CONCLUSION

5.1 Policy Implications

5.1.1 Public Credit Registry

While the costs of screening borrowers have been abstracted away from in the environment, they are undoubted a friction in the provision of finance. Information sharing between lenders has been found to reduce adverse lending outcomes and is particularly effective in the case of informationally opaque firms (Doblas-Madrid and Minetti (2013)). Additionally, public credit registries may help promote balanced financial development. While we abstract away from these considerations, there is evidence that financial liberalization vis-á-vis foreign bank entry can impair localistic financial development of poorer countries (Detragiache et al. (2008)) by cream-skimming. When foreign banks rely heavily on hard information technologies, they may end up taking the most profitable firms upon entry to a new market, leaving domestic banks to compete over costlier, more opaque firms. The establishment of a public credit registry helps mitigates these concern by reducing the costs of hard information acquisition and monitoring; moreover, the production of publicly-available hard-information may induce foreign bank entrant to lend to more domestic firms than they otherwise would have.

5.1.2 Trade Counterparty Data Collection

National governments routinely collect transaction-level data on international trade as a part of their customs administration. As an example, the Customs and Border Protection division of the United States Department of Homeland Security make the following data available to the public, upon request: carrier code; vessel country code; vessel name; district/port of unlading; estimated arrival date; bill of lading number; foreign port of lading; manifest quantity; manifest units; weight; weight units; shipper name & address[1]; consignee name & address; notify party name & address; piece count; description of goods; container number; and seal number (l/l (2022)).

While this data is publicly-available, it must be requested through the Freedom of Information Act and is delivered via mail on a CD-ROM. Consequently, there are a number of firms that harvest this information, reformat it, and sell subscriptions to their reformatted database, frequently marketing the subscription to other importing companies as a way to identify the foreign suppliers of their competitors. That this information is commercially valuable should give one pause. Information that is valuable to firms with an international presence will likely be valuable to banks the lend to firms with an international presence.

Presently, the data is only available for goods transported via ocean vessel; the data would be far more valuable were it to cover all modes of transport. As we have argued, monitoring export activity is far more difficult than monitoring domestic activity as the physical distance between the lender and the alleged source of its borrower's revenues precludes efficient information-gathering. If the US were to simply re-format the data it is already collecting into a manner that is easily accessible and usable, it could be of significant benefit to localistic banks that would otherwise be unable to conduct counterparty monitoring in an efficient matter.

5.2 Conclusion

This paper investigated the degree to which spatial variation in the composition of local banking sectors - and by extension, spatial variation in firms' exposure to bank branches specialized in supporting international trade - can explain variation in firms' internationalization. Using a rich data set on Italian manufacturing firms and their local banking sectors, we documented a persistent pattern in the sensitivity of export activity to access

[1]Shipper, consignee, and notify party all can request that their name and address be redacted.

to the branches of particular types of banks. We further documented that this sensitivity is seemingly moderated by the likelihood that the firm is credit-rationed.

In order to explain such empirical patterns, we developed an extension of the Melitz (2003) heterogeneous firm framework for international trade that allows for financial heterogeneity. After calibrating the model, we investigated how shocks to different dimensions of financial development affect firm export and domestic activity. We find that - while local financial development is indeed important for export, the type of financial development itself is crucial. A localistic financial deepening - that is, an increase in access to more domestically-oriented banks - expands firms' export participation, but can decrease export sales of more established exporters and, overall, shrink gross trade in aggregate. By contrast, increases in access to non-localistic finance - that is, finance that is better prepared to support cross-country transactions and prosecute collateral claims in jurisdictions outside the home country - drive increased export activity on both the intensive and extensive margins.

The analysis yields further insights into the mechanisms through which financial heterogeneity influences real activity. First, we document empirically - and reproduce theoretically - that for a firm that is severely credit rationed, most any type of credit - no matter its specialization - can induce increased investment in any one of the firm's lines of business. However, this effect grows more muted as the firm's access to external finance increases, eventually reversing sign. Second, we document that financial heterogeneity can generate significant divergences in the profiles of active firms in response to increased credit access. In particular, while localistic financial deepenings can broaden the pool of potential firms by inducing the entry of smaller firms, this is not necessarily typical of all shocks to financial access. Specifically, when non-localistic bank branches specialize in support of international transactions, non-localistic financial deepenings exacerbate existing inequalities in the profile of active firms by only helping strong firms.

In addition to shedding light on the mechanisms through which heterogeneity in banking structure affects trade, this analysis also sheds light on the quantitative significance of these mechanisms for trade. Through simulated counterfactuals, we found that a reversal of the Italian non-localistic banking development experience of the 1990s generates a 3.4% reduction in aggregate exports, despite assuming that changes to banking development do not affect the overall supply of bank credit. Further, we established that a 1% increase in non-localistic banking development generate an increase to aggregate exports that is approximately 11% of the increase that would be generated by a 1% fall in net trade barriers. These results clearly demonstrate that one cannot and should not abstract away from the composition of a financial sector when evaluating the effects of financial development on firm internationalization and aggregate trade flows.

The paper leaves open relevant questions for future research. First, while we investigated bank specialization vis-à-vis domestic and foreign activities, we were not able to investigate the degree to which banks may specialize in a particular destination market. Investigating the prevalence of such specializations could prove helpful in further understanding observed patterns of international trade. Second, while we studied bank specialization in the context of firm internationalization, the framework itself can be adopted to investigate the implications of bank specialization along other dimensions. This could help elucidate the contexts in which the scope of real activity is itself being shaped by finance. We leave these and other relevant questions to future research.

APPENDICES

APPENDIX A

APPENDIX - EMPIRICS

A.1 Tables & Figures

Table 1: Data sources and variable definitions

Variable	Definition (source in parentheses)
Export	Equals **1** if firm exports; **0** otherwise. (A)
Share export	Foreign sales/Total sales (A)
Total branches	Avg. % growth in prov. branches, 91-97. (B/C)
Local branches	Avg. % growth in prov. localistic branches, 91-97. (B/C)
Comm. branches (ln)	Log. ratio of # of commercial branches/pop. (B/C)
# of employees	Total # of employees in the year of survey. (A)
Capital intensity	Tangible fixed assets/total employees. (A)
Firm age	# of years since inception. (A)
Branches/pop. (1991)	# of prov. branches per 100K persons, 1991. (C)
Corporation	Equals **1** if firm is a private/public limited company. (A)
Consortium	Equals **1** if firm belongs to consortium, **0** otherwise. (A)
Labor productivity	Value added/total employees. (A)
Sector of activity	Map ATECO code into Pavitt (1984) taxonomy (A)
North	Equals **1** if firm in northern region; **0** otherwise. (A)
Center	Equals **1** if firm in central region; **0** otherwise. (A)
South	Equals **1** if firm in southern region; **0** otherwise. (A)
Leverage	Total liabilities/Equity (A)
Rationing	Equals **1** if firm is rationed; **0** otherwise. (A)
Local branches, 1936	# of prov. localistic branches/100K persons, 1936. (D)
Savings branches, 1936	# of prov. savings branches/100K persons, 1936. (D)
Mutual branches, 1936	# of prov. mutual branches/100K persons, 1936. (D)
# of branches, 1936	# of prov. branches/100K persons, 1936. (D)

4 main data sources are used in the firm-level empirical analysis: (A) the 1997 wave of the Mediocredito Centrale Survey of Italian Manufacturing Firms; (B) the province-level database of the Italian National Statistics Office; (C) the Statistical Bulletin of the Bank of Italy; and (D) the book "Struttura funzionale e territoriale del sistema bancario italiano 1936-1974" by the Bank of Italy.

Table 2: Firm-level Analysis: Summary Statistics

	Full sample			Export status		
	Obs	Mean	StdD	Export	∼Export	t-stat.
Export	4489	0.660	0.474			
Share Export	3198	38.549	28.762			
Total branches	4490	0.075	0.042	0.075	0.074	-1.146
Local branches	4490	0.044	0.034	0.045	0.041	-3.934
# of employees	4480	117.741	368.953	147.675	59.779	-9.631
Capital int. (ln)	2996	-7.293	0.930	-7.337	-7.185	3.825
Age	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
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 int. 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

Table 3: Baseline Specification - Extensive Margin

	(1)	(2)	(3)	(4)	(5)
	Panel A: Extensive Margin				
	Probit	Probit	Probit	Probit	2SLS
VARIABLES	Export				
Tot. branches	2.074*	2.360^{+}	2.045	6.438*	-0.196
	(0.933)	(1.217)	(2.124)	(2.625)	(3.557)
Tot. branches * RZ		-0.816		2.073	1.636
		(2.051)		(2.451)	(4.504)
Loc. branches			0.037	-5.148	-1.707
			(2.650)	(3.278)	(3.125)
Loc. branches * RZ				15.707**	0.593
				(5.806)	(5.597)
Rajan-Zingales		-0.007		0.327	-0.137
		(0.229)		(0.233)	(0.477)
1991 branches/pop.	0.353	0.357	0.350	0.364	-0.225
	(0.440)	(0.441)	(0.440)	(0.449)	(0.217)
+ Controls	Y	Y	Y	Y	Y
N	2,906	2,906	2,906	2,906	2,909
R^2	0.131	0.131	0.131	0.134	0.131
F instruments					1.277

Notes: Standard errors clustered at the provincial level are in parentheses.
+ ($p < 0.10$), * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)

Table 4: Baseline Specification - Intensive Margin

	(6)	(7)	(8)	(9)	(10)
	Panel B: Intensive Margin				
	OLS	OLS	OLS	OLS	2SLS
VARIABLES	Share Export				
Tot. branches	126.881**	93.853**	231.092**	248.969**	374.744$^+$
	(18.807)	(21.562)	(41.042)	(52.309)	(203.568)
Tot. branches * RZ		100.845*		148.910**	16.658
		(38.355)		(48.060)	(182.105)
Loc. branches			-133.581**	-203.784**	-327.704$^+$
			(49.494)	(66.659)	(179.115)
Loc. branches * RZ				190.305	702.057*
				(116.189)	(345.549)
Rajan-Zingales		-1.383		1.069	28.968
		(3.614)		(4.815)	(18.878)
1991 Branches/pop.	23.805**	23.376**	29.886**	29.653**	18.229
	(7.639)	(7.533)	(7.372)	(7.267)	(18.701)
+ Controls	Y	Y	Y	Y	Y
N	2,220	2,220	2,220	2,220	2,220
R^2	0.179	0.182	0.182	0.186	0.169
F instruments					1.580

Notes: Standard errors clustered at the provincial level are in parentheses.
+ ($p < 0.10$), * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)

Table 5: Subsampling

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: Leverage							
	Lev. >median		Lev. <median		Lev. >median		Lev. <median	
VARIABLES	Export				Share Export			
Tot. 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)
Loc. 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
N	1,463	1,463	1,439	1,439	1,104	1,104	1,115	1,115
R^2	0.147	0.147	0.140	0.140	0.198	0.200	0.174	0.178
	Panel B: Rationing							
	Rationed		No Rationed		Rationed		No Rationed	
VARIABLES	Export				Share Export			
Tot. 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)
Loc. 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
N	353	353	2,495	2,495	273	273	1,920	1,920
R^2	0.164	0.164	0.129	0.129	0.255	0.263	0.180	0.182

Notes: The table reports Probit coefficients in columns (1)-(4) and OLS coefficients in columns (5)-(8). Standard errors clustered at the provincial level are in parentheses. + ($p < 0.10$), * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)

Table 6: Alternative Specification

VARIABLES	(1) Probit Export	(2) OLS Share Export
Total branches	1.173	239.691**
	(2.325)	(45.256)
Popular bank branches	0.370	-195.000**
	(2.928)	(61.041)
Saving banks branches	2.748	-136.731*
	(3.209)	(54.488)
Mutual banks branches	-5.800	-171.577
	(5.808)	(128.167)
Other local banks branches	-0.925	-123.402*
	(3.025)	(57.560)
Branches/ pop. (1991)	0.372	29.438**
	(0.508)	(9.590)
+ Controls	Y	Y
N	2,838	2,166
R^2	0.130	0.181

Notes: Standard errors clustered at the provincial level are in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Province-level Analysis: Summary Statistics

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

All variables are in terms of their first difference.

Table 8: Provincial Banking Environments and Export Intensity

	(1)	(2)	(3)
		(exports/capita)$_{pt}$	
loc$_{pt}$	-468.4*	-540.2**	-476.9*
	(184.0)	(193.1)	(225.1)
nloc$_{pt}$	287.4	238.8	212.7
	(209.1)	(207.7)	(225.4)
$\ln(\frac{\text{Y-X}}{\text{cap.}})_{pt}$	-4,444.1**	-4,415.4**	-4,507.9**
	(1,579.2)	(1,541.1)	(1,491.0)
$\ln(\frac{\text{RY-RX}_1}{\text{cap.}})_{pt}$			
$\ln(\frac{\text{RY-RX}_2}{\text{cap.}})_{pt}$			
ln(wk. age)$_{pt}$	46,945.7*	47,005.7*	62,458.7**
	(23,050.2)	(23,126.7)	(22,182.1)
$\sim$ fin. corp.$_{pt}$	0.0462	0.0420	0.203***
	(0.112)	(0.113)	(0.036)
$(\frac{\text{inv.}}{\text{cap.}})_{rt-2}$		0.882*	0.859**
		(0.362)	(0.324)
$(\frac{\text{real inv.}}{\text{cap.}})_{rt-2}$			
fin. corp.$_{pt}$			-4.636***
			(0.586)
Test:			
loc. = nloc.	Reject	Reject	Reject
F-test	7.35**	7.97**	4.97*
Sector E/X	No	No	No
Year FE	Yes	Yes	Yes
Prov. FE	Yes	Yes	Yes
Exp. Deflator			
N	412	412	412
R^2	0.359	0.371	0.403

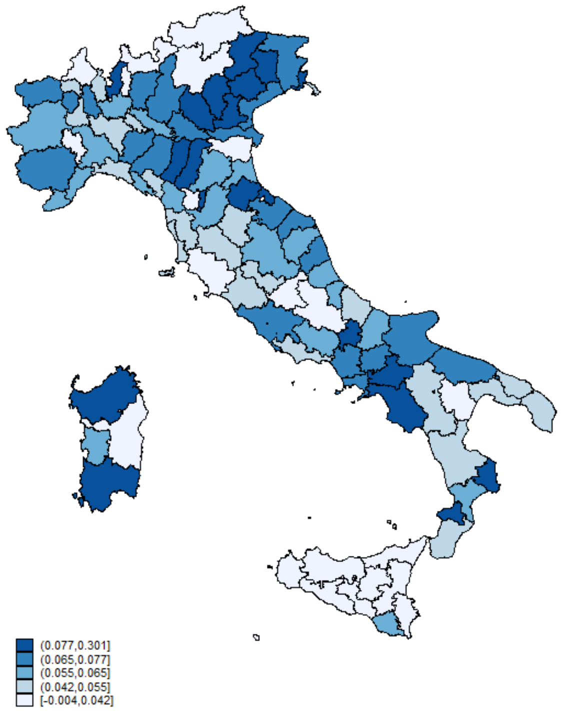
All variables in specifications (1)-(6) have been first-differenced. lloc = $\ln(\frac{\text{nloc. brches}}{\text{cap.}})_{pt}$. nlloc = $\ln(\frac{\text{nloc. brches}}{\text{cap.}})_{pt}$. Standard errors in parentheses.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8 (cont'd)

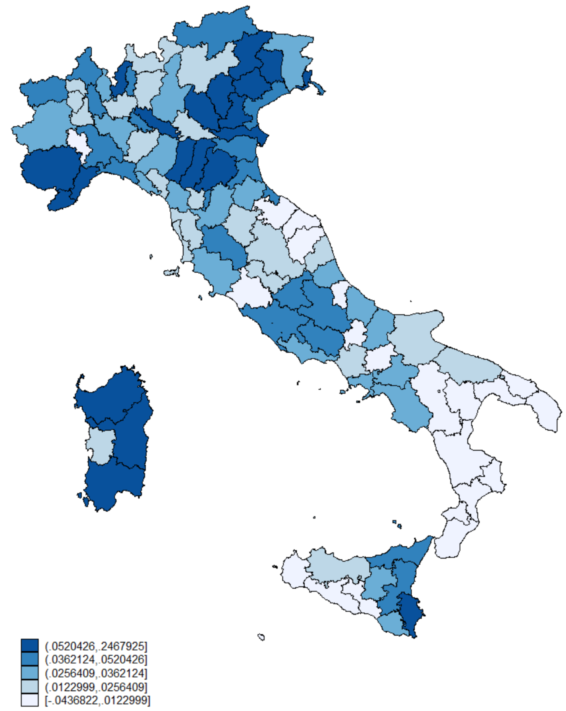
	(4) (exports/capita)$_{pt}$	(5) (real exports/capita)$_{pt}$	(6)
loc$_{pt}$	-459.2*	-385.9*	-436.6*
	(188.9)	(168.5)	(173.8)
nloc$_{pt}$	195.5	196.0	240.1
	(228.0)	(219.0)	(227.0)
$\ln(\frac{\text{Y-X}}{\text{cap.}})_{pt}$	-4,254.0**		
	(1,542.3)		
$\ln(\frac{\text{RY-RX}_1}{\text{cap.}})_{pt}$		-4,345.7**	
		(1,426.7)	
$\ln(\frac{\text{RY-RX}_2}{\text{cap.}})_{pt}$			-4,537.1**
			(1,448.7)
ln(wk. age)$_{pt}$	35,633.5	25,064.1	15,533.7
	(28,173.7)	(26,077.3)	(26,312.5)
$\sim$ fin. corp.$_{pt}$			
$(\frac{\text{inv.}}{\text{cap.}})_{rt-2}$	0.710^{+}		
	(0.371)		
$(\frac{\text{real inv.}}{\text{cap.}})_{rt-2}$		0.451	0.657^{+}
		(0.312)	(0.334)
fin. corp.$_{pt}$			
Test:			
loc. = nloc.	Reject	Reject	Reject
F-test	5.67*	5.22*	6.72*
Sector E/X	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Prov. FE	Yes	Yes	Yes
Exp. Deflator		UVI	MPPI
N	412	412	412
R^2	0.430	0.312	0.3686

All variables in specifications (1)-(6) have been first-differenced. lloc = $\ln(\frac{\text{nloc. brches}}{\text{cap.}})_{pt}$. nlloc = $\ln(\frac{\text{nloc. brches}}{\text{cap.}})_{pt}$. Standard errors in parentheses.$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

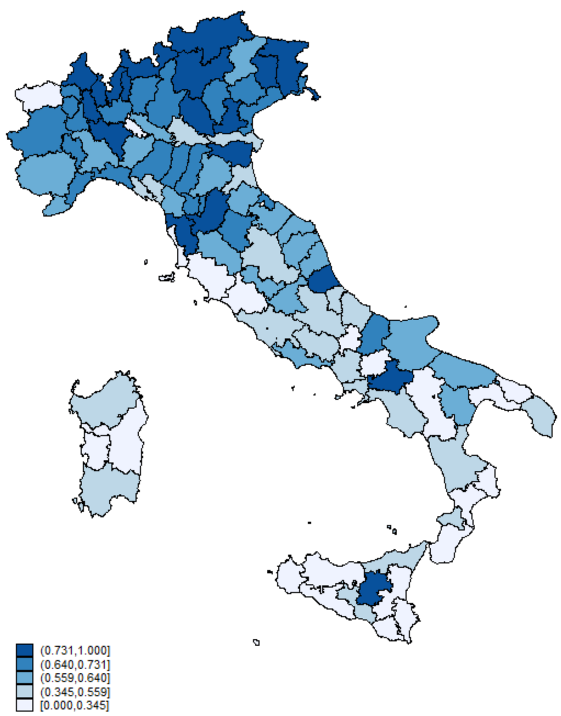
Figure 1: Local Banking Development and Export Propensity



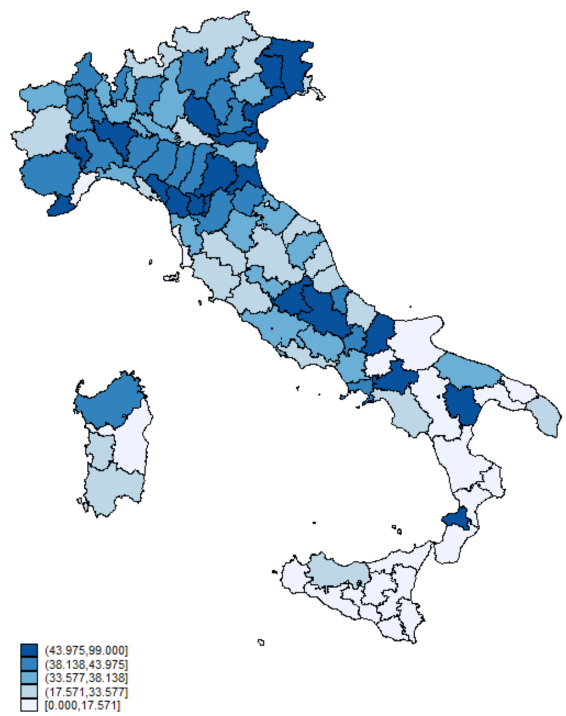
(a) Growth Rate of Total Branches



(b) Growth Rate of Local Branches

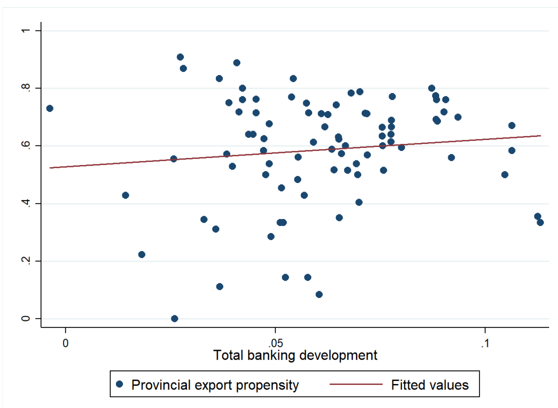


(c) Share of Total Firms That Export

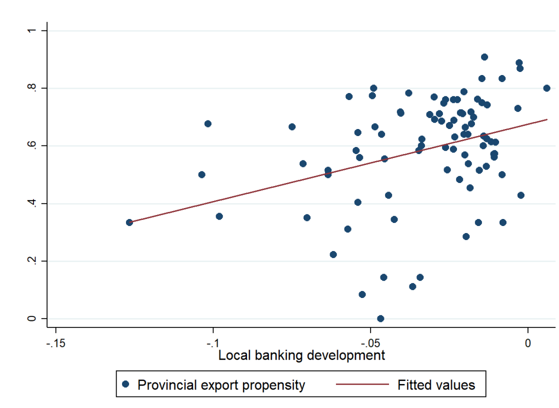


(d) Export Sales over Total Sales

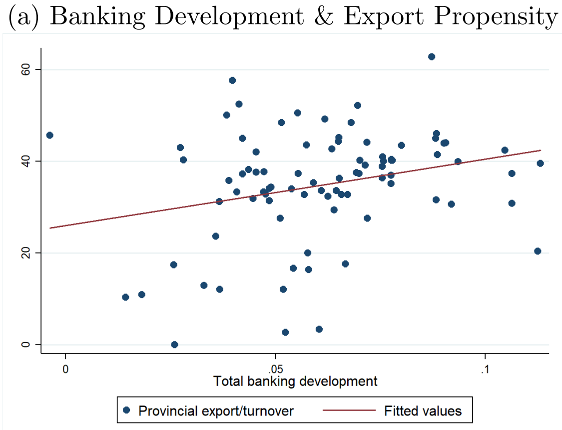
Figure 2: Banking Development, Banking Structure and Export Activities (1997)



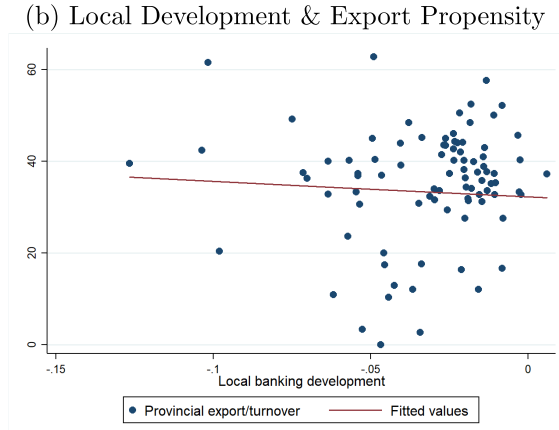
(a) Banking Development & Export Propensity



(b) Local Development & Export Propensity

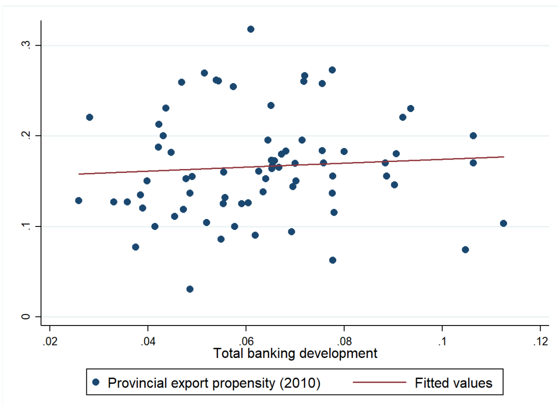


(c) Banking Development & Export Intensity

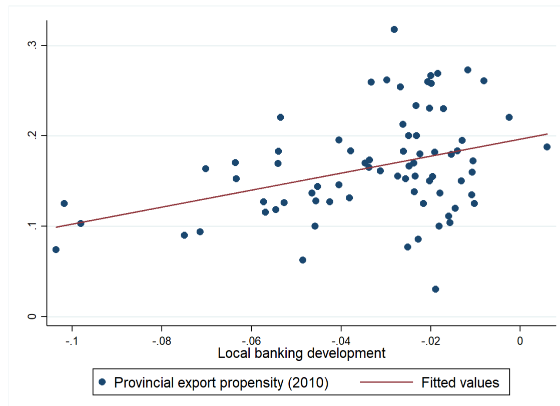


(d) Local Development & Export Intensity

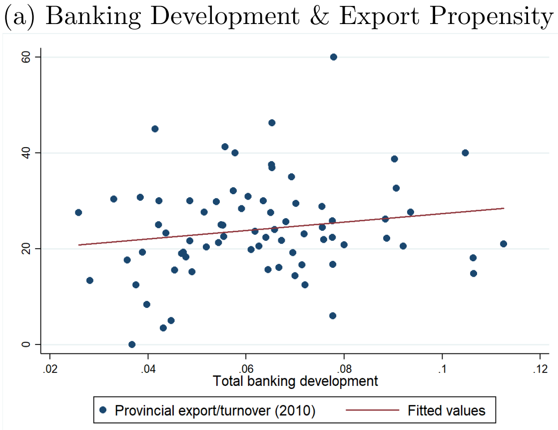
Figure 3: Banking Development, Banking Structure and Export Activities (2010)



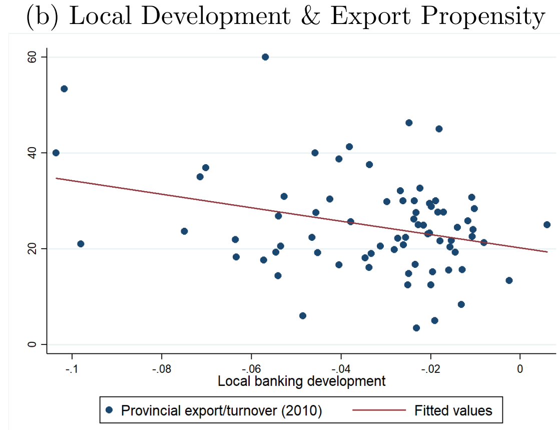
(a) Banking Development & Export Propensity



(b) Local Development & Export Propensity



(c) Banking Development & Export Intensity



(d) Local Development & Export Intensity

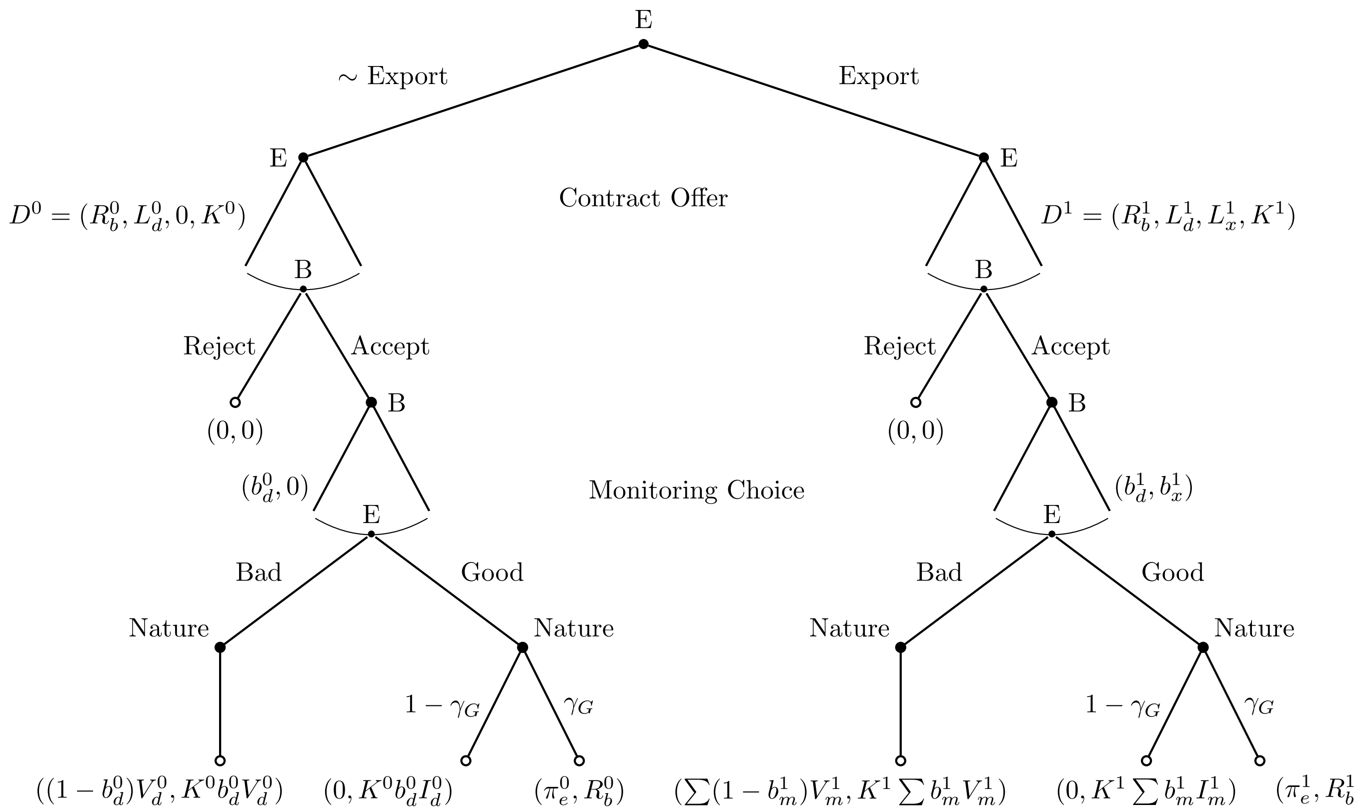
The main data source for the export data in Figure 3 is the VII UniCredit Survey on Small Businesses, a survey carried out by the Italian banking group UniCredit in 2010. This survey gathers data on a sample of Italian firms that are customers of the UniCredit bank, having turnover up to 5 million euros. 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).

APPENDIX B

APPENDIX - THEORY

B.1 Tables & Figures

Figure 4: Firm-Bank Loan Contracting Game: Extensive Form



B.2 Proofs

B.2.1 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] Back to text.

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 services the domestic market[2]. 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 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

[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.

[2] Recall again the following:

$$\begin{aligned} I_m &= c\tau_m q_m;\ \tau_d = 1 \\ C_m &= b_m I_m \end{aligned} \tag{B.1}$$

- $T(\cdot) = T(X, D(K); s_b) \in \{0, 1\}$ 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.

B.2.1.1 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:

$$\gamma\big(\sum_m R_m - R_b\big) - E \geq \sum_m (1 - b_m)V_m - E. \tag{B.2}$$

Recall that we assume the entrepreneur is able to 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:

$$
\begin{aligned}
\pi_e(1, D(1), 1, \ell_d, \ell_x, 1) &= \gamma(\sum_m R_m - R_b) - E(1+r) \\
\pi_b(1, D(1), 1, \ell_d, \ell_x, 1) &= \gamma R_b + (1-\gamma)\sum_m C_m - (1+r)[\sum_m \{I_m + F_m + \ell_m\} - E] \\
\pi_e(1, D(1), 1, \ell_d, \ell_x, 0) &= \sum_m \{(1-b_m)(I_m + F_m)\} - E \\
\pi_b(1, D(1), 1, \ell_d, \ell_x, 0) &= \sum_m C_m - (1+r)[\sum_m \{I_m + F_m + \ell_m\} - E] \\
\pi_e(1, D(0), 1, \ell_d, \ell_x, 1) &= \gamma(\sum_m R_m - R_b) - E \\
\pi_b(1, D(0), 1, \ell_d, \ell_x, 1) &= \gamma R_b - (1+r)[\sum_m \{I_m + F_m\} - E] \\
\pi_e(1, D(0), 1, \ell_d, \ell_x, 0) &= \sum_m \{(1-b_m)(I_m + F_m)\} - E \\
\pi_b(1, D(0), 1, \ell_d, \ell_x, 0) &= -(1+r)[\sum_m \{I_m + F_m + \ell_m\} - E]
\end{aligned}
\tag{B.3}
$$

B.2.1.2 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

$$
\begin{gathered}
(\ell_d, \ell_x) = \text{argmax}\{\pi_b(b_d, b_x | D, T)\} \\
\text{where} \\
\pi_b(b_d, b_x | D, T) = \begin{cases}
\max_{(b_d, b_x) \in \Gamma^T} \{T * \gamma R_b + (1 - T * \gamma) K * \sum_m C_m \\
\qquad -(1+r)[\sum_m \{I_m + F_m + \ell_m\} - E] \\
\quad \text{where} \\
\Gamma^1 = \{(b_d, b_x) \in [0,1]^2 : T(1, C(K)) = 1\} \\
\Gamma^0 = \{(b_d, b_x) \in [0,1]^2 : T(1, C(K)) = 0\}
\end{cases}
\end{gathered}
\tag{B.4}
$$

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 $(\ell_d(\cdot), \ell_x(\cdot))$.

B.2.1.3 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,

$$\max_{b_d, b_x} \pi_b(b_d, b_x | T) \geq 0 \tag{B.5}$$

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

B.2.1.4 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. $\rightarrow\leftarrow$

□

With these results in hand, we present the following proposition:

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

Proof. Given that the bank will reject any contract that does not both induce use of the good technology and does not 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

$$\gamma R_b \geq \big[\sum_m \{I_m + F_m + \ell_m\} - E\big](1+r) - (1-\gamma) * K * \sum_m C_m \tag{B.6}$$

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

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 compatibility constraint using the participation constraint of the bank[3]. The entrepreneur thus equivalently solves:

$$\max_{p_m,E}\{\gamma\sum_m R_m + (1-\gamma)*K*\sum_m C_m - (1+r)\sum_m\{I_m + F_m + \ell_m\} + rE\}$$
$$\text{subject to the following constraints} \tag{B.7}$$
$$\gamma(\sum_m R_m - R_b) - E \geq \sum_m\{(1-b_m)(I_m+F_m)\} - E;\ \ \ell_m = \ell_m(p_d, p_x, E)$$

From here, it is obvious to see that:

$$K*\sum_m C_m\Big|_{K=1} \geq K*\sum_m C_m\Big|_{K=0} = 0 \tag{B.8}$$

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 allows the entrepreneur to appropriate all project surplus. □

As we proceed, we will need to use some shorthand in order to keep the notation relatively clean. For the succeeding analysis, we use the following notation:

$$\begin{aligned} &I_m = c\tau_m q_m;\quad \tau_d \equiv 1; \\ &V_m = I_m + F_m;\quad V = \sum_m V_m; \\ &C_m = b_m I_m;\quad \Psi = \sum_m \psi_m \end{aligned} \tag{B.9}$$

[3]From here on, we will refer to this transformed incentive compatibility constraint simply as "the reduced incentive compatibility constraint".

With this idea in hand, we may present the following corollary:

Corollary 1.

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

$$\begin{aligned}
&\max_{p_m,\ell_m,E} \sum_m \{\gamma R_m + (1-\gamma)C_m - V(1+r)(1+\Psi)\} + rE \\
&\text{subject to} \\
&\pi_e \geq \sum_m (1-b_m)V_m - E; \quad E \leq W.
\end{aligned} \tag{B.10}$$

Back to text.

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 an identical monitoring labor levels choice to 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,

$$(p_d, p_x, E) = \underset{p_m, \ell_m, E}{\operatorname{argmax}} \sum_m \{\gamma R_m + (1-\gamma)C_m - V(1+r)(1+\Psi)\} + rE$$
$$\text{subject to} \tag{B.11}$$
$$\pi_e \geq \sum_m (1-b_m)V_m - E; \quad E \leq W.$$

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:

$$\begin{aligned} \pi_e(1, C(1), 0, \ell_m, T) &= 0 \\ \pi_b(1, C(1), 0, \ell_m, T) &= 0 \\ \pi_e(1, C(0), 0, \ell_m, T) &= 0 \\ \pi_b(1, C(0), 0, \ell_m, T) &= 0 \end{aligned} \tag{B.12}$$

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

B.2.1.5 Entrepreneur's Extensive Margin Decision

The entrepreneur optimal export entry function is given by

$$X = \mathbb{1}\big\{\pi_e(b_d, b_x, G) \geq \pi_e(b_d, G)\big\} \tag{B.13}$$

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

B.3 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.

Back to text.

APPENDIX C

APPENDIX - CALIBRATION

C.1 Tables & Figures

Table 9: Parameter Values

Parameter	Value	Definition
A	2520	industry demand parameter
τ	1.16	iceberg trade cost
α_{loc}	2500	localistic 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 parameter
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

Table 10: Moment-Matching

Moment Description	Empirical Moments	Simulated Moments
median(total sales)	63.7059	65.3257
median($\frac{\text{earnings before taxes}}{\text{total sales}}$)	0.2029	0.1400
$\frac{\text{total foreign sales}}{\text{total domestic sales}}$	0.4475	0.3986
fraction: domestic-only	0.4051	0.3947
fraction: domestic-only, credit-satiated	0.3428	0.2586
fraction: exporters	0.5949	0.6053
fraction: exporters, credit-satiated	0.5063	0.4579
mean: $\frac{\text{debt}}{\text{assets}}$	0.9212	0.8089
std. dev.: $\frac{\text{debt}}{\text{assets}}$	0.0890	0.1327
mean: $\frac{\text{total fixed costs}}{\text{total sales}}$	0.1172	0.1229
std. dev.: $\frac{\text{total fixed costs}}{\text{total sales}}$	0.0866	0.0536
median($\frac{\text{int. pymts.}}{\text{total debt}}\|(X,R)=(0,0)$)	0.0303	0.0429
median($\frac{\text{int. pymts.}}{\text{total debt}}\|(X,R)=(0,1)$)	0.0425	0.0554
median($\frac{\text{int. pymts.}}{\text{total debt}}\|(X,R)=(1,0)$)	0.0333	0.0464
median($\frac{\text{int. pymts.}}{\text{total debt}}\|(X,R)=(1,1)$)	0.0497	0.0568
corr(log(total sales),log(1+equity))	0.5835	0.2758
corr(log(1+equity),log(fixed costs))	0.4779	0.1993
corr(log(fixed costs),log(total sales))	0.6567	0.2467

Table 11: Shock-induced Changes in Key Real Variables

Category	Sim. Moment	LBD +1%	NBD +1%	LBD -28%	NBD -43%
Real Aggregates	Total Sales	0.37	0.22	-0.16%	-0.12%
	Domestic Sales	1.15	-1.91	-0.49%	1.19%
	Foreign Sales	-1.59	5.55	0.67%	-3.40%
	Mfg. Employment	1.36	0.66	-0.49%	-0.35%
	Active Firms	0.73	-1.27	-0.25%	0.85%
	Dom. Firms	1.73	-8.84	-0.83%	5.31%
	Export Firms	0.08	3.67	0.13%	-2.06%
Financial Provision	Total Loans	1.90	1.03	-0.69%	-0.57%
	Total Int. Pmts.	-11.99	-5.16	4.36%	2.95%
	Avg. Int. Rate	-13.89	-6.18	5.08%	3.54%
	Std. Dv., Loan	1.27	2.68	-0.24%	-1.63%
	Std. Dv., Int. Pmts.	-8.60	-4.42	3.42%	2.62%
	Avg. Rat'n.: Exp.	-64.06	-126.36	21.39%	78.09%
	Avg. Rat'n.: Dom.	-133.28	8.60	32.64%	23.55%
Firm Distribution	Ind. Eff. Prod. $\tilde{\mu}$	1.55	0.70	-0.54%	-0.39%
	$\Pr(q_d > 0)$	2.50	-0.57	-0.88%	0.39%
	$\Pr(q_x > 0)$	1.85	4.36	-0.50%	-2.51%
	Avg. Sales	-0.34	1.49	0.09%	-0.96%
	Std. Dv., Sales	-1.72	0.45	0.16%	-1.40%
	Avg. π | Ent.	-2.76	0.36	0.89%	-0.39%
	Std. Dv., π | Ent.	-1.44	0.46	0.56%	-0.34%

The LBD/NBD +1% (LBD -28%/NBD -43%) variable responses are quoted in terms of *basis point* (*percentage point*) changes from their value under the benchmark calibration.

Table 12: Change in Average Market Revenues by Firm Status

		Post-Shock Status									
		Δ Avg. Foreign Revenues					Δ Avg. Domestic Revenues				
Pre-Shock Status		X|S	X|R	D|S	D|R	IA	X|S	X|R	D|S	D|R	IA
LBD ↑1%	X|S	-0.01	-0.67	-34.11			-ε	-0.88	0.89		
	X|R	0.23	ε	-101.79	-22.88		0.34	0.02	4.99	6.77	
	D|S	21.46	62.55				-0.42	-4.14	-ε		-52.07
	D|R	12.79	39.26				-0.10	-8.50	0.01	0.04	-73.45
	IA								66.99	48.94	
NBD ↑1%	X|S	0.01	-0.68				-0.01	-0.84			
	X|R	0.25	0.02	-137.68	-89.34		0.32	0.01	4.97	11.17	
	D|S	28.34	50.31				-0.65	-3.68	-0.01	-0.01	-46.69
	D|R	12.69	35.93				-0.18	-7.29		-0.01	-46.92
	IA									81.15	

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. Quantities denote absolute changes in market-m sales for firms with pre-/post-shock statuses (p, q).

Table 13: Change in Aggregate Market Revenues by Firm Status

		Post-Shock Status									
		Δ Aggr. Foreign Revenues					Δ Aggr. Domestic Revenues				
		X|S	X|R	D|S	D|R	IA	X|S	X|R	D|S	D|R	IA
Pre-Shock Status: LBD $\uparrow$1%	X|S	-2.95	-0.06	-0.27			-0.95	-0.03	ε		
	X|R	0.10	-0.23	-1.33	-0.03		0.06	0.30	0.03	ε	
	D|S	0.21	2.07				-ε	-0.05	-0.53		-0.03
	D|R	0.03	0.87				-ε	-0.08	-ε	0.60	-0.55
	IA								0.10	2.27	
Pre-Shock Status: NBD $\uparrow$1%	X|S	0.75	-0.06				-0.84	-0.03			
	X|R	0.10	1.11	-1.17	-0.15		0.05	0.09	0.02	0.01	
	D|S	0.64	3.58				-0.01	-0.10	-0.46	-ε	-0.18
	D|R	0.03	0.73				-ε	-0.06		-0.24	-0.38
	IA									0.23	

X for exporter, D for domestic-only, S for credit-satiated, R for credit-rationed, and IA for inactive. 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.

Table 14: Trade Margin Decomposition

Margin	Type	Domestic Sales LBD	Domestic Sales NBD	Foreign Sales LBD	Foreign Sales NBD
Intensive	Export Status Change	-0.10	-0.15		
	¬Export Status Change	1.24	-0.74	-1.35	2.60
Extensive	Market Size Effect	-1.79	-0.69	-1.79	-0.69
	Distribution Shift	1.80	-0.33	1.55	3.65
Total	Total Change in B.P.	1.15	-1.91	-1.59	5.55

Table 15: Banking Development Reversals and Trade Shock Counterfactuals: Changes to Aggregate Revenue by Firm Status

Pre-Shock Status		Post-Shock Status: Δ Aggr. Foreign Revenues					Δ Aggr. Domestic Revenues				
		X|S	X|R	D|S	D|R	IA	X|S	X|R	D|S	D|R	IA
LBD reversal	X|S	93.7	2.6	-4.3	-2.3		28.8	-1.3	0.1	ε	
	X|R	2.2	6.7	-21.8	-24.6	-ε	1.0	-12.7	1.03	1.7	-ε
	D|S	7.0	7.9				-ε	-0.1	15.2	0.6	1.3
	D|R		0.3					-ε		-21.4	-63.6
	IA								1.2	1.6	
NBD reversal	X|S	-43.3	-20.0	-33.3	-1.7		42.9	0.6	0.5	ε	
	X|R	1.3	68.0	-145.3	-31.8		1.4	-5.9	6.3	3.0	
	D|S		1.4					-ε	26.4	ε	
	D|R		0.2					-ε	0.1	13.4	-0.7
	IA								9.8	21.0	
$(\tau - 1) \downarrow 1\%$	X|S	23.75	ε				-5.27	-ε			
	X|R	0.07	7.79	-1.33	-0.05		0.04	-1.68	0.02	ε	
	D|S	4.65	15.17				-0.04	-0.46	-2.62	-ε	-1.87
	D|R	0.02	1.76				-ε	-0.16		-1.45	-4.31
	IA								0.44		

X for exporter, D for domestic-only, S for credit-satiated, R for credit-rationed, and IA for inactive. 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.

Table 16: Comparing Response Magnitudes: Trade Shocks vs. Financial Shocks

Category	Sim. Moments	$(\tau - 1) \downarrow 1\%$ (basis pts.)	LBD $\uparrow$1%	NBD $\uparrow$1%
Real Aggregates	Total Sales	2.3	15.8%	9.4%
	Domestic Sales	-17.4	-6.6%	11.0%
	Foreign Sales	51.8	-3.1%	10.7%
	Mfg. Employment	2.3	59.2%	28.8%
	Active Firms	-6.5	-11.2%	19.4%
	Dom. Firms	-53.5	3.2%	16.5%
	Exporters	24.1	0.3%	15.2%
Financial Provision	Total Loans	2.3	55.4%	29.9%
	Total Int. Pmts.	9.2	-130.0%	-55.9%
	Avg. Int. Rate	5.8	-239.5%	-106.7%
	Std. Dv., Loan	8.9	13.5%	28.3%
	Std. Dv., Int. Pmts.	13.3	-64.9%	-33.3%
	Avg. Rat'n..: Exp.	132.0	-48.5%	-95.7%
	Avg. Rat'n.: Dom.	-37.4	356.7%	-23.0%
Firm Distribution	Ind. Eff. Prod. $\tilde{\mu}$	4.3	36.0%	16.2%
	$\Pr(q_d > 0)$	-7.6	-32.7%	7.5%
	$\Pr(q_x > 0)$	23.0	8.1%	19.0%
	Avg. Sales	8.9	-3.9%	16.8%
	Std. Dv., Sales	9.0	-0.9%	16.9%
	Avg. π | Ent.	7.6	8.1%	19.0%
	Std. Dv., π | Ent.	7.7	-18.6%	5.9%

The first column provides the basis point responses of the given variables induced by a 1% reduction in net trade barriers, $(\tau - 1)$. The "rescaled" columns normalize the responses to the localistic and non-localistic financial shocks given in Table 11 by the magnitudes of the corresponding trade shock responses.

Figure 5: Effects of a 1% Increase in Localistic Banking Access on Aggr. Exports

Pre	Post: X|S	Post: X|R	Post: Tot.
X|S	-1.60	-0.06	
X|R	0.11	0.20	
Tot.			-1.35

Intensive Margin:
Incumbent Exporter
Scale Changes

+

Pre	Post: X|S	Post: X|R	Post: Tot.
X|S	-1.35	-ε	
X|R	-ε	-0.43	
Tot.			-1.79

Extensive Margin:
Firm Entry Mass
Changes [1]

+

Pre-Shock	Post-Shock Status: X|S	X|R	D|S	**D|R**	Tot.
X|S			-0.27		
X|R			-1.33	-0.03	
D|S	0.21	2.07			
D|R	0.03	0.87			
Tot.					1.55

Extensive Margin:
Changes to
Distribution of
Feasible Exporters

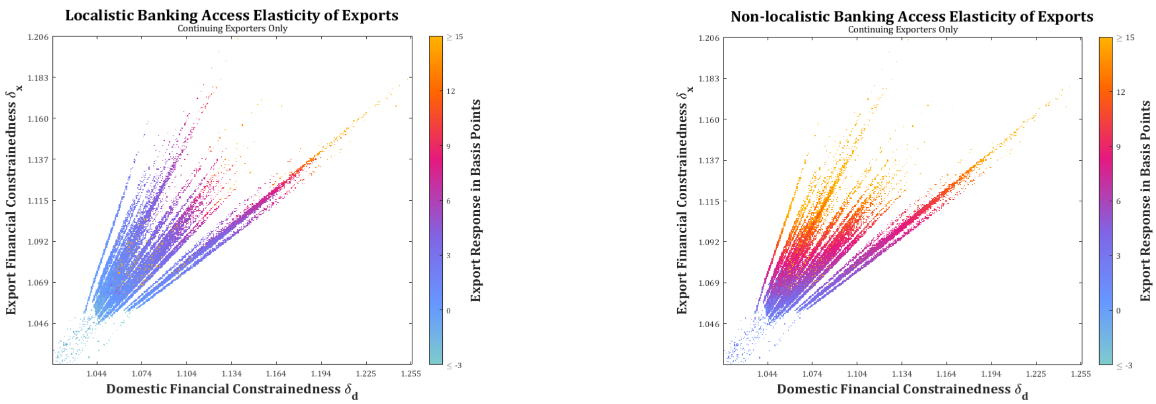
=

Pre-Shock	Post-Shock Status: X|S	X|R	D|S	D|R	Tot.
X|S	-2.95	-0.06	-0.27		
X|R	0.10	-0.23	-1.33	-0.03	
D|S	0.21	2.07			
D|R	0.03	0.87			
Tot.					-1.59

Total Change in
Aggregate Exports

[1]Technically, the cell entries on the off-diagonals of the full transition matrix (e.g., D|R to X|S, etc.) are nonzero; however, their magnitudes are negligible.

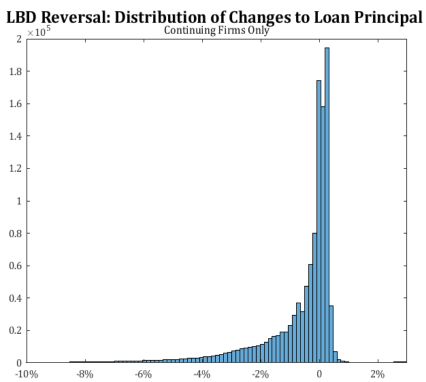
Figure 6: Heterogeneity in Continuing Exporters' Banking Access Elasticity of Exports



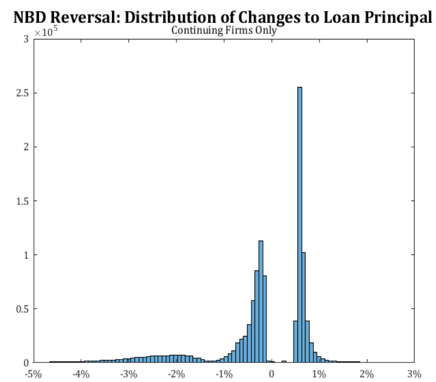
(a) The cluster of firms near the origin represent the least-financially constrained exporters. Since they do not lack for pledgeable income, these firms only realize a substitution effect from increases in localistic banking access. As such, their export responses is negative.

(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 investment. As domestic financial constrainedness decreases, this crowd-out effect decays and the export response grows.

Figure 7: Heterogeneity in Firm Credit Access Post a Re-regulatory Shock



(a) When simulated LBD reverts to 1990 levels, approximately 58% of firms' loan principal declines. This shallowing of the localistic banking sector weakens industry competition, improving the relative performance of firms in provinces with higher localistic banking density. Upper/lower bounds have been trimmed to fit all responses between the 0.5% and 99.5% percentiles.



(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. Upper/lower bounds have been trimmed to fit all responses between the 0.5% and 99.5% percentiles.

Pre-Shock (LBD Reversal)	Post-Shock Status: X|S	X|R	D|S	D|R	IA
X|S	35.6	-2.5	-1.6	-0.9	
X|R	1.7	-17.7	-7.4	-7.7	$-\varepsilon$
D|S	2.8	2.9	7.0	-0.6	-0.9
D|R		ε		-24.3	-57.2
IA			0.8	1.4	

Pre-Shock (NBD Reversal)	Post-Shock Status: X|S	X|R	D|S	D|R	IA
X|S	4.6	-9.9	-12.5	-0.6	
X|R	1.7	-38.0	-50.2	-9.2	
D|S		0.5	19.8	ε	
D|R		0.1	0.1	10.9	-0.6
IA			7.4	18.7	

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

C.2 Computational Considerations

C.2.1 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 In particular, we define

$$\begin{aligned} b_m &= e^{-10*x_m} \\ E &= 100*y \end{aligned} \tag{C.1}$$

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.

C.2.2 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 the **S**equential **Q**uadratic **P**rogramming algorithm . 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[2]; 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 for our firm NLPs.

C.2.3 Generating Quality Start Values

C.2.3.1 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:

$$\hat{p}_m = \frac{\tau_m}{\varepsilon\varphi\gamma} \tag{C.2}$$

C.2.3.2 Generating initial market monitoring values

We then define a nonlinear system comprised of the first-order condition(s) of the firm's profit-maximization problem with respect to bank monitoring evaluated at $\hat{p}_m$ in the *unconstrained* case. Using MATLAB, we use the solver *fsolve* to solve this system. To improve solver accuracy, we provide the analytical gradient of our nonlinear system. We define distinct systems for the domestic-only and export cases and solve for the implied b_m separately.

It should be noted here that *fsolve* does not allow for the imposition of variable bounds; given that our convex optimization problem is only guaranteed a global solution on a particular subdomain of Euclidean space[3], the *fsolve* could return $b_m < 0$ were some local minimum

[2] Assumptions that guarantee convergence to some local optimum from a remote starting point are harder to establish.

[3] $\mathbb{R}_{++} \times [0, 1)$ for the domestic-only problem and $\Re^2_{++} \times [0, 1)^2$ in the case of the exporter's problem.

to be found there. In practice, virtually all solutions are in the proper subdomain; in the rare case that the solver returns $b_m < 0$, we replace $b_m = 0.225$. This value appears to have the best results when starting values for b_m have been not allowed to vary with firm simulate θ.

C.2.3.3 First solution attempt

Using the optimal prices from the Melitz-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:

$$\begin{aligned} &\max_{p_m, x_m, y_m} \sum_m \{\gamma R_m + (1-\gamma) C_m - V(1+r)(1+\Psi)\} + rE \\ &\text{subject to } p_m, b_m \in \mathbb{R}_+, E \in [0, W_i] \end{aligned} \tag{C.3}$$

As this problem includes variable bounds, we use MATLAB's *fmincon* with the SQP algorithm. We set aside all firms with negative profits as their profits can only worsen with the imposition of additional constraints.

C.2.3.4 Generating start values for fully-constrained problem

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:

$$\max_{p_m, b_m} \sum_m \{\gamma R_m + (1-\gamma) b_m I_m\} - V(1+r)(1+\Psi) - \xi \sum_m (1-b_m) V_m \tag{C.4}$$

If $\xi = \frac{\lambda}{1+\lambda}$, then the solutions to the semi-constrained program will coincide with that of the fully-constrained program[4]. To see why, note that the first-order conditions for the above program are as follows:

$$\begin{aligned} p_m &= \frac{\tau_m}{\varepsilon\gamma\varphi}\Big[(1+r)(1+\Psi) + \xi(1-b_m) - (1-\gamma)b_m\Big] \\ b_m &= 1 - \left(\frac{\alpha_m(1+r)V}{\alpha_m(1+r)V + (1-\gamma+\xi)I_m + \xi F_m}\right)^{1/2}. \end{aligned} \tag{C.5}$$

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 simulate. Let π and g be the value of the firm's objective function and diversionary benefits at the unconstrained solution, respectively; then, we specify our guess for $\xi = \frac{\lambda}{1+\lambda}$ as follows

$$\xi = \left(\mathbb{1}\left[\frac{g-\pi}{\pi} < 1\right] * \mathbb{1}[g-\pi > 0] * \frac{g-\pi}{\pi} + (1 - \mathbb{1}\left[\frac{g-\pi}{\pi} < 1\right]) * 1\right)^{3/4} \tag{C.6}$$

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.

[4]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.

C.2.3.5 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 every firm simulate whose unconstrained solution vector is nonnegative. While we might have omitted firms whose unconstrained solution generated nonnegative profits and did not violation the incentive compatibility constraint, we opted to solve the fully constrained program again for such firms, as it occasionally results in modest solution quality improvements.

C.3 Response of Financial Aggregates to Counterfactual Shocks

C.3.1 Re-regulation Experiments

Table 10 provides the responses of key quantities in response to our counterfactual re-regulatory experiment. When monitoring efficiency declines, more monitoring labor is required to liquidate the same amount of inventory; by extension, the firm must compensate the bank more for the same principal borrowed. Indeed, average interest rates increase 5.08% and 3.54% following a re-regulation of the localistic and non-localistic banking sectors, respectively. As interest payments increase, it becomes harder for an increasingly large subset of firms to satisfy their incentive compatibility constraint. While it is true that the average degree of credit-rationing increases for both domestic firms and export firms for both the localistic and non-localistic re-regulation experiments, the reasons differ slightly.

Localistic banks are used by both domestic-only and export firms alike, reductions in localistic bank branch access hurt both types of firms; however, only export firms use non-localistic banks. Why then should credit rationing increase for domestic-only firms? Recall again that this is a symmetric, two-country economy. A non-localistic bank branch re-regulation reduces the access of export firms in both Home and Foreign to non-localistic monitoring, reducing their export competitiveness. It is this deterioration in market competition facilitates the re-entry of highly credit-rationed, lower productivity firms that explains the increase in domestic-only credit rationing.

C.3.2 Trade Shock vs. Financial Shock

The signs and magnitudes of the responses of financial variables to financial shocks bear little resemblance to the corresponding responses of the trade barrier shock. This should come as no surprise; while the net trade barrier $\tau - 1$ and the monitoring cost function $\Psi(\cdot)$ have similar relationships to a firm's overall economic cost structure, the same cannot be said of their relationship to the provision of finance. Net trade barriers $\tau - 1$ affect the demand (and supply) for loans by scaling a firm's production costs, collateral value, and diversion value linearly. (Non)-localistic bank branch density affects the total supply of loans by determining (in part) the pledgeability of a firm's inventory assets nonlinearly.

The case of total interest payments provides an excellent example. The cost of bank monitoring is recovered in the firm's interest payments to the bank (i.e., the value paid to the bank beyond that which is needed to pay the principal). The localistic and non-localistic shocks reduce total interest payments, as the shock itself reduces the cost of monitoring. In contrast, the reduction in trade barriers increases total interest payments. As trade barriers fall, (1) exporters demand more loans to finance an increase in foreign sales and (2) the fall in trade barriers itself makes much of the increased loan demand incentive compatible under the current monitoring cost structure. However, to meet this increase in loan demand, more monitoring must be performed, implying more interest payments must be made to compensate the bank for this increased monitoring.

BIBLIOGRAPHY

BIBLIOGRAPHY

(2022). 19 CFR § 103.31 - Information on vessel manifests and summary statistical reports.

Amiti, M. and D. E. Weinstein (2011). Exports and Financial Shocks. *The Quarterly Journal of Economics 126*(4), 1841– 1877.

Angelini, P. and N. Cetorelli (2003). The Effects of Regulatory Reform on Competition in the Banking Industry. *Journal of Money, Credit and Banking 35*(5), 663–684.

Antràs, P. and C. F. Foley (2015, August). Poultry in Motion: A Study of International Trade Finance Practices. *Journal of Political Economy 123*(4), 853–901.

Bartoli, F., G. Ferri, P. Murro, and Z. Rotondi (2014, February). Bank support and export: evidence from small Italian firms. *Small Business Economics 42*(2), 245–264.

Beck, T. (2003). Financial Dependence and International Trade. *Review of International Economics 11*(2), 296–316.

Berger, P. G., M. Minnis, and A. Sutherland (2017, November). Commercial lending concentration and bank expertise: Evidence from borrower financial statements. *Journal of Accounting and Economics 64*(2-3), 253–277.

Berman, N. and J. Héricourt (2010, November). Financial factors and the margins of trade: Evidence from cross-country firm-level data. *Journal of Development Economics 93*(2), 206–217.

Bernard, A. B. and J. B. Jensen (2004). Why Some Firms Export. *The Review of Economics and Statistics 86*(2), 561–569. Publisher: The MIT Press.

Bricongne, J.-C., L. Fontagné, G. Gaulier, D. Taglioni, and V. Vicard (2012, May). Firms and the global crisis: French exports in the turmoil. *Journal of International Economics 87*(1), 134–146.

Burkart, M. and T. Ellingsen (2004, May). In-Kind Finance: A Theory of Trade Credit. *American Economic Review 94*(3), 569–590.

Caballero, J., C. Candelaria, and G. Hale (2018, November). Bank linkages and international trade. *Journal of International Economics 115*, 30–47.

Caggese, A. and V. Cuñat (2013, January). Financing constraints, firm dynamics, export decisions, and aggregate productivity. *Review of Economic Dynamics 16*(1), 177–193.

Chaney, T. (2016, November). Liquidity constrained exporters. *Journal of Economic Dynamics and Control 72*, 141–154.

Chen, Z., S. Poncet, and R. Xiong (2020, March). Local financial development and constraints on domestic private-firm exports: Evidence from city commercial banks in China. *Journal of Comparative Economics 48*(1), 56–75.

Chor, D. and K. Manova (2012, May). Off the cliff and back? Credit conditions and international trade during the global financial crisis. *Journal of International Economics 87*(1), 117–133.

Costantini, J. A. and M. J. Melitz (2009, June). 4. The Dynamics of Firm-Level Adjustment to Trade Liberalization. In D. Marin, E. Helpman, and T. Verdier (Eds.), *The Organization of Firms in a Global Economy*, pp. 107–141. Harvard University Press.

De Jonghe, O., H. Dewachter, K. Mulier, S. Ongena, and G. Schepens (2020, February). Some Borrowers Are More Equal than Others: Bank Funding Shocks and Credit Reallocation. *Review of Finance 24*(1), 1–43.

Degryse, H. and S. Ongena (2005). Distance, Lending Relationships, and Competition. *Journal of Finance 60*(1), 231–266.

Detragiache, E., T. Tressel, and P. Gupta (2008). Foreign Banks in Poor Countries: Theory and Evidence. *The Journal of Finance 63*(5), 2123–2160.

Doblas-Madrid, A. and R. Minetti (2013, July). Sharing information in the credit market: Contract-level evidence from U.S. firms. *Journal of Financial Economics 109*(1), 198–223.

D'Onofrio, A., R. Minetti, and P. Murro (2019, January). Banking development, socioeconomic structure and income inequality. *Journal of Economic Behavior & Organization 157*, 428–451.

FATF and Egmont Group (2021, March). Trade-Based Money Laundering: Risk Indicators. Technical report, Financial Action Task Force, Paris, France.

Feenstra, R. C., Z. Li, and M. Yu (2014, October). Exports and Credit Constraints under Incomplete Information: Theory and Evidence from China. *Review of Economics and Statistics 96*(4), 729–744.

Girardone, C. (2000, February). *Analyzing the Determinants of Bank Efficiency - the Case of Italian Banks*. Ph. D. thesis, University of Wales, Bangor.

Grisorio, M. J. and M. Lozzi (2012). Propensity to Export of Italian Firms: Does Local Financial Development Matter? *Rivista italiana degli economisti 2012*(2), 299.

Guiso, L., P. Sapienza, and L. Zingales (2004, August). Does Local Financial Development Matter? *The Quarterly Journal of Economics 119*(3), 929–969.

Guiso, L., P. Sapienza, and L. Zingales (2006, August). The Cost of Banking Regulation. Technical Report w12501, National Bureau of Economic Research, Cambridge, MA.

Habib, M. A. and D. B. Johnsen (1999). The Financing and Redeployment of Specific Assets. *The Journal of Finance 54*(2), 693–720.

Iacovone, L., E. Ferro, M. Pereira-López, and V. Zavacka (2019, May). Banking crises and exports: Lessons from the past. *Journal of Development Economics 138*, 192–204.

Judd, K. L. (1998, September). *Numerical Methods in Economics.* Cambridge, MA, USA: MIT Press.

Kydland, F. E. and E. C. Prescott (1982). Time to Build and Aggregate Fluctuations. *Econometrica 50*(6), 1345–1370.

Liberti, J. M., J. Sturgess, and A. Sutherland (2017). Information Sharing and Lender Specialization: Evidence from the U.S. Commercial Lending Market. *SSRN Electronic Journal Working paper.*

Manova, K. (2013, April). Credit Constraints, Heterogeneous Firms, and International Trade. *The Review of Economic Studies 80*(2), 711–744.

Melitz, M. J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica 71*(6), 1695–1725.

Minetti, R. and S. C. Zhu (2011, March). Credit constraints and firm export: Microeconomic evidence from Italy. *Journal of International Economics 83*(2), 109–125.

Muûls, M. (2015, March). Exporters, importers and credit constraints. *Journal of International Economics 95*(2), 333–343.

Paravisini, D., V. Rappoport, and P. Schnabl (2015, December). Specialization in Bank Lending: Evidence from Exporting Firms. Technical Report w21800, National Bureau of Economic Research, Cambridge, MA.

Paravisini, D., V. Rappoport, P. Schnabl, and D. Wolfenzon (2015, January). Dissecting the Effect of Credit Supply on Trade: Evidence from Matched Credit-Export Data. *The Review of Economic Studies 82*(1), 333–359.

Pavitt, K. (1984, December). Sectoral patterns of technical change: Towards a taxonomy and a theory. *Research Policy 13*(6), 343–373.

Rajan, R. G. and L. Zingales (1998). Financial Dependence and Growth. *The American Economic Review 88*(3), 559–586.

Sears, J. (2019, January). Site Visits Still Matter. Here's Why.

Silver, M. (2009, June). Do Unit Value Export, Import, and Terms-of-Trade Indices Misrepresent Price Indices? *IMF Staff Papers 56*(2), 297–322. ISBN: 9781589067950 Publisher: International Monetary Fund Section: IMF Staff Papers.

Tarantola, A. M. (2007, June). Internazionalizzazione e localismo. Speech at Giornata di studio: le Banche di Credito Cooperativo nel processo di internazionalizzazione delle PMI italiane. Ruoli e prospettive.

Xu, C. (2022, April). Reshaping Global Trade: The Immediate and Long-Run Effects of Bank Failures. *The Quarterly Journal of Economics*, Accepted manuscript.