The Impact of Credit Availability on Small Business Exporters

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Contents

Executive Summary

International trade flows declined dramatically in the wake of the recent financial crisis, far beyond what might be expected based on historical relationships. For example, census data show that the value of U.S. exports of goods and services dropped by more than 14 percent from 2008 to 2009. The fact that the decline in exports was unusually large in this particular episode has been attributed by many to a supply effect emanating from the tightening of credit availability. Credit plays a particularly important role for exporters for at least two reasons:

- First, exporters rely on credit to finance their working capital to a greater extent than do firms producing solely for their domestic market, in large part because of the longer transportation time associated with exported goods.
- Second, cross-border transactions are deemed to be more risky, so that payment guarantees provided by banks and other financial intermediaries play an important role in assuring both delivery of purchased goods to the importer and payment to the exporter.

Thus, a deterioration in the ability or willingness of banks to provide financing will have a greater adverse impact on exporting firms than on firms producing goods for domestic consumption. Moreover, because small businesses typically rely more than large firms on bank credit, a tightening of credit might be expected to adversely affect small and medium-sized enterprises (SMEs) (with fewer than 500 employees) more than larger firms with access to national and international credit markets. Thus, given the relatively greater reliance on financial intermediaries by exporting firms, one might expect SME exporters to have been more adversely affected by the financial crisis than larger exporting firms.

Using the U.S. Commerce Department's International Trade Administration Exporter Database (ITAED), this study investigates the differential impact on SME exporters of bank health, disaggregated by industry and separately by state. The study investigates the extent to which the sensitivity to bank health of small firm total exports (share of dollar volume) across industries is related to the relative degree of external finance dependence of the industries. The evidence indicates that, indeed, the small firm export share declines in response to a deterioration in bank health, with a greater adverse impact for export firms in industries that are more reliant on external finance. These results hold for alternative measures of bank health.

Moreover, the evidence is stronger for smaller firm size classes. The effects are evident for the smallest firm size class, firms with fewer than 20 employees, and for small firms with fewer than 100 employees. However, once the size threshold is raised to include all firms with fewer than 500 employees, the effects tend to dissipate. Thus, the adverse effects of a deterioration in bank health appear to be relatively stronger for exporting firms with fewer than 100 employees.

The evidence for the state-level analysis indicates that local bank health does matter. However, the analysis is limited because the firm size data cannot be disaggregated into small firm size classes of fewer than 500 employees. Still, the results indicate that both the median capital ratio measure and the median nonperforming loan ratio measure for large banks have significant effects on the state-level small firm export share, indicating that a deterioration in large bank health has stronger adverse effects on SME exporters than on larger exporting firms.

I. Introduction[1]

International trade flows declined dramatically in the wake of the recent financial crisis. According to figures from the U.S. Census Bureau and Bureau of Economic Analysis, the value of U.S. exports of goods and services declined from $1.84 trillion in 2008 to $1.58 trillion in 2009.[2] Moreover, the unprecedented declines in late 2008 and 2009 exceeded what might be expected based on historical relationships. While the demand for exports typically declines with a weakening of economic activity in importing countries, the fact that the decline in exports was unusually large in this particular period has been attributed by many to a supply effect emanating from the tightening of credit availability (for example, Iacovone and Zavacka 2009; Amiti and Weinstein 2011). Credit plays a particularly important role for exporters for at least two reasons. First, exporters rely on credit to finance their working capital to a greater extent than do firms producing solely for their domestic market, in large part because of the longer transportation time associated with the delivery of exported goods. Second, cross-border transactions are deemed to be more risky, so that payment guarantees provided by financial intermediaries play an important role in assuring both delivery of purchased goods to the importer and payment to the exporter. Thus, a deterioration in the ability or willingness of banks to provide financing will have an adverse impact on exporting firms to a greater degree than on firms producing goods for domestic consumption.

This study investigates the relative impact of the recent financial crisis and the Great Recession on small business exporters. Because small businesses typically rely more than large firms on bank credit, a tightening of credit might be expected to adversely affect small and

[1] The author thanks the Office of Advocacy staff for valuable comments on earlier drafts and Sunayan Acharya for valuable comments and research assistance. All errors remain the responsibility of the author.
[2] U.S. Bureau of the Census, U.S. International Trade in Goods and Services - Annual Revision for 2011, accessed 1/08/13 at https://www.census.gov/foreign-trade/Press-Release/2011pr/final_revisions/.

medium-sized enterprises (SMEs) (fewer than 500 employees) more than larger firms (500 or more employees) with access to national, and even international, credit markets. Thus, given the relatively greater reliance on banks by exporting firms, one might expect SME exporters to have been adversely affected by the financial crisis to an even greater degree than larger exporting firms.

This study focuses on two major aspects of SME exporter behavior relative to that of larger firms using the U.S. Department of Commerce's International Trade Administration Exporter Database (ITAED). This database, compiled by the federal government, contains the dollar volume of exports separately for SMEs (fewer than 500 employees) and for large firms (500 or more employees), with the SME data disaggregated into additional size classes for the industry-level data.

First, using the national data disaggregated by industry, this study investigates the extent to which the SME shares of the dollar volume of exports across industries are related to the relative degree of external finance dependence of the industries, using a measure of external finance dependence based on Rajan and Zingales (1998). One would expect to find that because SMEs tend to be more bank dependent than larger firms, the deterioration of bank health would have a larger adverse effect on small firm exporters compared with larger exporting firms, suggesting that the SME share of the dollar volume of total exports would have declined as a consequence of the financial crisis. Moreover, the relative declines in export volumes should be related to the extent to which firms are dependent on external finance. In particular, a deterioration in bank health should have a stronger adverse effect on exporting firms in industries that tend to be more dependent on external finance, with the effects being even more pronounced

for smaller firms that tend to be more bank dependent than larger firms that may have direct access to funding from financial markets.

The second major aspect of the study focuses on the ITAED database disaggregated by state. This database can exploit differences across states in bank health to investigate the relative performance of SME exporters compared with large firm exporters. The prediction is that the relative performance of SME exporters is related to the degree of the deterioration in bank health in the state in which the firms operate, insofar as smaller firms are more dependent on bank financing compared with larger firms. In particular, the small firm export share for firms headquartered in a state will show a greater decline in states where the health of banks operating in the state deteriorates more.

The evidence indicates that, indeed, the small firm export share declines in response to a deterioration in bank health, with the adverse impact being greater for export firms in industries that rely more on external finance. These results hold for alternative measures of bank health. Moreover, the evidence is stronger for smaller firm size classes. The effects are evident for the smallest firm size class considered, those with fewer than 20 employees, and remain when the threshold is raised to define small firms as those with fewer than 100 employees. However, once the threshold is raised to include all firms with fewer than 500 employees, the effects tend to dissipate. Thus, the adverse effects of a deterioration in bank health appear to affect exporting firms with fewer than 100 employees more than is the case for larger firms. In fact, the effect of deteriorating bank health on firms with 100 to 499 employees appears to differ little from that on firms with 500 or more employees.

The evidence for the state-level analysis indicates that local bank health does matter. However, the analysis is limited because the firm size data cannot be disaggregated into size

classes within the SME size class of fewer than 500 employees. Still, the results indicate that both the median capital ratio (Riskcap) measure and the median nonperforming loan (NPL) ratio measure for large banks have significant effects of the predicted sign on the state-level small firm export share, suggesting that a deterioration in large bank health has stronger adverse effects on the exports of SMEs than on those of larger firms.

II. Literature Review

Two important strands of literature are particularly relevant for this study. First, a substantial literature exists emphasizing that small businesses tend to be "bank dependent." This literature emphasizes the importance of bank health in determining credit availability to SMEs. A second strand of literature concerns the determinants of international trade flows, with an emphasis on the importance of trade finance. The recent unprecedented decline in international trade flows has stimulated a resurgence in this literature.

The importance of bank health for small businesses

Previous literature has established that most small firms are "bank dependent" for their external finance. Furthermore, it has been shown that bank lending is adversely affected by a tightening of monetary policy, by regulatory changes that tighten capital requirements, and by bank capital crunches. More recently, the 2007-2009 financial crisis highlighted the importance of liquidity as a determinant of the ability of banks to satisfy loan demand. While a liquidity crisis is distinct from a tightening of monetary policy, they do share some characteristics in terms of the stress placed on banks in raising short-term funds.

Much of the literature on "relationship lending" has focused on asymmetric information problems associated with smaller firms. Udell (1997) describes small firms as "informationally opaque" compared with large firms, which are "informationally transparent." Small firms are informationally opaque because they usually have little or no collateral and, often being relatively young firms, lack an extensive history from which future firm or management performance can be extrapolated, even though the firm may have high growth potential. Because of their small size and the lack of substantial information on their quality, such firms have virtually no access to external funds from national markets, such as through the issuance of commercial paper, bonds, or publicly traded equity. Similarly, finance companies provide asset-backed financing, for example for loans collateralized by inventories and accounts receivable. Still, for a small, opaque firm with few tangible assets, bank loans may be the only source of an unsecured line of credit or of a loan secured by an asset that might not be easily commoditized. As a result, the clientele effect in bank lending results in many firms being bank dependent, having few alternatives to banks should their bank credit be curtailed or terminated.

Although nonbank financial intermediaries provide loans, open market instruments are available for short-term credit, and trade credit is available to some firms, these alternative sources of credit are not perfect substitutes for bank credit for a variety of institutional reasons. In particular, smaller firms are not able to issue such debt because the issue size would be too small to overcome the fixed costs of issuance at a reasonable interest rate. Similarly, firms that are sufficiently opaque or have a sufficiently low credit standing to require close monitoring by a financial intermediary would not have direct access to the credit markets. On the other hand, large, highly rated firms can directly access public credit markets by issuing commercial paper. However, issuing unsecured commercial paper still may require the issuing firms to obtain third-

party guarantees from banks to enhance the credit rating of the commercial paper and lower the interest cost to the firm. Thus, even though many larger firms have come to rely less on direct credit from banks, they still compete indirectly with small firms for bank resources, and this competition comes to the fore when credit markets come under stress, as has recently been the case (Peek 2011).

An important bank characteristic that affects the provision of bank credit is whether a bank faces a binding capital constraint. As a result of the "headwinds in monetary policy" noted by Chairman Greenspan during the recovery from the 1990 recession, a variety of authors have examined the impact that significant bank health problems can have on the efficacy of monetary policy. For example, Peek and Rosengren (1995a) examined the impact that capital constraints had on a bank's ability to lend during the period of significant banking problems in the early 1990s in New England. Using a simple static model, they show that banks facing a binding capital constraint are limited in altering the size of their balance sheets, restricting the ability of capital-constrained banks to respond to monetary policy shocks. They document that banks experiencing an adverse capital shock that makes the capital constraint binding will shrink both assets and liabilities. Peek and Rosengren (1995a) also show that the behavior of capital-constrained banks in New England differed from that of unconstrained banks, with the loan portfolios of unconstrained banks responding more to monetary policy shocks than those of the capital-constrained banks.

Peek and Rosengren (1995b) focus on the role of the enforcement of capital regulations through which bank supervisors can have a direct impact on the ability of capital-constrained banks to lend, and thus be able to increase loans in response to an easing of monetary policy. They examine the impact on bank lending of formal regulatory actions imposed on banks that

experienced asset quality problems. They find that the enforcement actions by bank regulators included achieving explicit capital targets over a short time frame. The result was an immediate and significant reduction in bank loan portfolios associated with the enforcement action that persisted for some time thereafter while the bank continued to operate under the enforcement action.

A number of authors have examined whether changes in capital regulations, by causing banks to become capital constrained, cause banks to be particularly responsive to their capital constraint, and, by implication, less responsive to changes in monetary policy. For example, Hall (1993) finds that the introduction of the Basel I Accord had a significant impact on bank portfolios. Hancock and Wilcox (1994) also found that the implementation of the Basel I Accord affected banks' willingness to lend. However, Berger and Udell (1994) do not find evidence that the Basel I Accord created a bank capital crunch. More recently, a concern raised with the Basel II Accord has been that the new capital regulations would magnify potential capital constraints during recessions (for example, Kashyap and Stein 2004), making banks less responsive to an easing of monetary policy. A very real concern with the effectiveness of the bank lending channel, and thus the overall effectiveness of monetary policy, is whether banks are capital constrained at the time of an easing of monetary policy. For example, given the liquidity crisis and bank capital problems, the recent easing of monetary policy may have little impact on increasing the availability of bank credit to firms.

Panel data techniques have provided more definitive results about the determinants of bank loan supply. The key is relating cross-sectional differences in the characteristics of banks or banking organizations to differences in the extent to which banks are able to insulate their loan portfolios from a tightening of monetary policy. Two bank characteristics appear to have been

the primary focus. First, the ability of banks to raise nonreservable liabilities to replace the lost reservable deposits is a key factor in determining the extent to which a bank must adjust its loan portfolio when monetary policy is tightened. Because these funds are, for the most part, uninsured liabilities, bank characteristics related to their access to external funds—for example, size, health, and having direct access to capital markets—play an important role in determining the ability of banks to insulate their loan portfolios from the effects of changes in monetary policy. Second, because banks face a capital requirement constraint in addition to the reserve requirement constraint on their activities, banks may differ in their response to a change in monetary policy depending on which constraint is most binding. If the capital ratio requirement is the binding constraint, easing the reserve requirement constraint through open market operations should have little, if any, effect on bank lending. That is, because the binding constraint has not been eased, expansionary monetary policy, at least operating through the bank lending channel, would be like "pushing on a string."

Kashyap and Stein (1995) note that with a tightening of monetary policy and the associated loss in reservable deposits, it is costly for banks to raise uninsured deposits. However, banks differ in the degree to which they have access to external funds. They hypothesize that bank size is a reasonable proxy for their degree of access to uninsured liabilities, with smaller banks having more limited access, and thus having their loan portfolio affected more by a tightening of monetary policy. Indeed, they find empirical support for the proposition that small banks are more responsive (shrink their loan portfolios by more) to tightened monetary policy than are large banks.

Subsequently, Kashyap and Stein (2000) extend their analysis of the relative ease with which banks can raise uninsured deposits following a monetary policy tightening, noting that the

bank loan response also will differ depending on the liquidity position of the bank. A bank that finds it relatively costly to raise uninsured deposits, but has large securities holdings, has the option of adjusting to shrinking reservable deposits by selling some of its securities, while a less liquid bank may be forced to shrink its loan portfolio by a greater degree. In a large cross-section of banks, they find evidence that the loan portfolios of smaller, more illiquid banks are the most responsive to monetary policy shocks.

Campello (2002) distinguishes among these smaller banks based on whether or not they are affiliated with a large multibank holding company. He finds that the lending of small affiliated banks reacts less to tightening monetary policy than that of similar small stand-alone banks. The affiliated small banks may thus be more able to insulate their lending from tightening monetary policy, but it is unclear whether this is caused more by large multibank holding companies channeling internal funds to subsidiaries, or by these large companies' easier access to external funds. Campello tries to address this issue by using capital-to-asset ratios to distinguish among bank holding companies. Similarly, Kishan and Opiela (2000) use a bank's capital-to-asset ratio as the proxy for the ability of a bank to raise uninsured deposits, finding that the loan portfolios of well-capitalized banks are less sensitive to monetary policy shocks than those of poorly capitalized banks of the same size.

Holod and Peek (2007) use the distinction between publicly traded and non-publicly traded banks to classify banks by the ease with which they can access external funds. They find that after controlling for size, capitalization and other factors, the loan portfolios of publicly traded banks shrink less than those of non-publicly traded banks when monetary policy tightens because of the banks' ability to raise external funds, including issuing large time deposits. Furthermore, as one would expect, when a distinction is made between tightening and easing

monetary policy, the estimated effect can be attributed to the effects of monetary policy tightening (tightening a binding constraint) rather than monetary policy easing (possibly "pushing on a string").

The importance of trade finance for exports

Even before the recent financial crisis, an extensive literature investigated the impact of financial frictions on international trade. This literature has included both theoretical and empirical studies, with the early empirical studies tending to be cross-country studies relating country-specific measures of financial development and financial frictions to international trade flows (for example, Kletzer and Bardhan 1987; Beck 2002, 2003; Matsuyama 2005; Do and Levchenko 2007; Greenaway et al. 2007). However, the dramatic response of exports to the economic slowdown and the global financial crisis stimulated interest in investigating the relationship between trade finance and exports (for example, Iacovone and Zavacka 2009; Auboin 2009; Bricongne et al. 2010 (France); Behrens et al. 2010 (Belgium); Berman and Martin 2010 (Africa); di Mauro et al. 2010 (Euro Area); Chor and Manova 2011; Paravisini et al. 2011 (Peru); Feenstra et al. 2011 (China); Amiti and Weinstein 2011 (Japan)), with a movement away from country-level data to a more disaggregated industry or firm-level analysis.

As described by Amiti and Weinstein (2011), among others, the production of exports is more sensitive to financial shocks than the production of similar goods for domestic consumption because of the higher working capital requirements and the higher default risk associated with international trade transactions. First, because of the longer time lags due to the delivery distances involved, exporters tend to require more working capital than do producers of domestic goods and services. Second, exporters must protect themselves against the risk of

default by importers in foreign countries. This is typically done through financial intermediaries, primarily banks, using letters of credit and bankers' acceptances. In this way, third parties (banks) provide exporters a reduction in counterparty risk, which likely is much more important than for domestic transactions because the counterparties are at a greater physical delivery distance and, more important, they are in other countries with different laws and regulations and different degrees of enforcement of those laws and regulations.

Although motivated by the dramatic decline in international trade during the recent financial crisis, Iacovone and Zavacka (2009) base their analysis on historical data from 23 past banking crises in a variety of developed and developing countries between 1980 and 2000. They find that banking crises affect export growth in sectors with a relatively high reliance on external finance more than in sectors less reliant on external finance. Moreover, exports from industries that tend to have more tangible assets (such as machinery, buildings, land, and inventory) suffer relatively less from a banking crisis than industries with less tangible assets. Demand shocks amplify the trade finance effect; that is, weakened demand associated with recessions in importing countries (as was the case in the recent crisis) magnifies the adverse effects of a restricted credit supply on exporters.

It is difficult to disentangle weakened demand for trade finance from restricted supply when economic activity is contracting. Still, if as estimated (di Mauro et al. 2010) about 90 percent of international trade relies on some form of trade finance, credit availability is likely central to explaining the fluctuations in exports. A first pass at isolating credit supply effects is to focus on imports coming into a given country from a set of exporting countries with varying credit conditions. Chor and Manova (2011) take exactly that approach, using monthly data on U.S. imports. They find that countries with tighter credit conditions experienced weaker exports

to the United States during the 2008-2009 crisis period. Moreover, the adverse effects were stronger for industries that tend to rely relatively more on external finance or have fewer tangible assets that can be used as loan collateral, consistent with the findings by Iacovone and Zavacka (2009) noted above.

Of course, burrowing down to the individual firm level can be even more informative. For example, using firm-level data for China, Feenstra et al. (2011) focus on the higher working capital needs and greater risk associated with exporting firms compared with firms producing for the domestic market. They find that, in fact, banks do treat exporting firms differently than firms producing solely for the domestic market, with exporters facing tighter credit constraints, most likely because they are deemed to expose the lender to more risk. Moreover, the recent financial crisis tightened the credit constraints on exporters even more, although, as might be expected, multinational firms were subjected to less severe credit constraints. This may reflect that lenders view exporting by large multinational firms as less risky compared with domestic firms, or simply that operations of multinational firms may be exporting to their affiliates in other countries for which payment guarantees provided by financial intermediaries are not needed.

In another firm-level study, Bricongne et al. (2010), using monthly data on a large sample of French exporters, were able to investigate the mechanisms through which exports were adversely affected during the recent financial crisis. They focus on differences across firms in terms of their size, degree of globalization and reliance on external finance. They find that firms in industries that tend to rely relatively more on external finance were more severely affected. Interestingly, they do not find that small firms were hit disproportionately relative to large firms once they control for export destinations and industries, although they speculate that in the aftermath of the crisis smaller firms may exhibit higher exit rates from the exporting business.

Still, two other studies dig even deeper by matching individual firms to individual banks in order to exploit differences across banks in their ability or willingness to provide credit. Paravisini et al. (2011) focus on Peru, while Amiti and Weinstein (2011) focus on Japan. Paravisini et al. (2011) find that banks in Peru responded to adverse liquidity shocks by reducing credit availability to firms, leading firms to curtail their exports, with the reduction in credit availability accounting for about 15 percent of the decline in Peruvian exports during the crisis.

Amiti and Weinstein (2011) build an even stronger case for the importance of credit availability for international trade, providing quite convincing evidence on the hypothesized mechanisms underlying the trade finance channel. Not only do they show that the health of a firm's main bank matters more for exporters than for firms serving the domestic market, they also show that the trade finance effects are related to the longer time lag for seaborne shipments compared with air freight, and to the perceived riskiness of exporters, with weaker bank health having no impact when default risk is less an issue for exports by firms with foreign affiliates.

III. Hypotheses

The key hypothesis to be tested in this study is that SME exporters are more sensitive to credit availability than are larger exporters. SMEs tend to be bank dependent, and thus are affected more by a deterioration in bank health. Moreover, this effect is magnified for exporting firms because exporters tend to be more sensitive to credit availability than are non-exporting firms, both because of the longer time lags involved with exporting due to the delivery distances involved and because of the greater default risk associated with having counterparties to the export transactions located in a different country with different laws and regulations and different degrees of enforcement of those laws and regulations.

Among the specific hypotheses to be tested are:

1. The share of the dollar volume of total exports attributable to SMEs declined during the financial crisis as bank health deteriorated.
2. The extent of the decline in the share of the dollar volume of total exports attributable to SMEs is greater for firms in industries that rely more on external finance.
3. The share of the dollar volume of total exports attributable to SMEs depends on local bank health, as measured by bank health in the state in which an exporting firm is headquartered, with the share falling with a deterioration in bank health.

The dependent variables are constructed as the SME share of the total dollar volume of exports. Because exports are affected by myriad factors that are difficult to quantify, this choice for the dependent variable is preferable to alternative measures based solely on SME exports, such as the percentage change in SME exports. Such measures would require the regression equation to include a number of variables to control for fluctuations in export demand. For example, export demand would be expected to be sensitive to factors such as the dollar exchange rates and fluctuations in real economic activity of those countries that import U.S. goods and services. In contrast, under the key assumption that fluctuations in export demand will be reflected similarly in the exports of large and small firms, other things equal, controls for import demand are not required, insofar as fluctuations in import demand would affect exports by large and small firms similarly.

While SMEs are typically identified as firms with fewer than 500 employees, three alternative firm size classes will be considered for the industry-level analysis: (1) firms with fewer than 20 employees, (2) firms with fewer than 100 employees, and firms with fewer than 500 employees. The expectation is that the exports of the firms in the smaller size classes will be

affected relatively more by a deterioration in the availability of bank credit than the exports of firms in the larger size classes. However, for the state-level analysis, only one firm size distinction is available in the data: fewer than 500 employees and 500 or more employees.

IV. Data

The primary data for this study come from four separate sources. These data sources include the U.S. Department of Commerce's International Trade Administration Exporter Database (ITAED), the Federal Deposit Insurance Corporation's Summary of Deposits (SOD), the Federal Reserve's Consolidated Reports of Condition and Income (Call Reports), and Compustat.

The ITAED is available only annually, with the 2009 data being the most recent data currently available. Because of a change in the data beginning in 2002, the analysis will be restricted to annual observations for the 2002-2009 period, which will provide a benchmark period prior to the financial crisis, as well as the 2008-2009 period when exports were hit hardest. Two specific files from the ITAED that separate data for SME exporters from large firm exporters are used: (1) national data disaggregated by industry, and (2) national data disaggregated by state. The ideal database would disaggregate the data by both industry and state in the same database. However, disclosure issues prevent the public release of the data at the state level with enough separate industry categories for meaningful sector distinctions. The industry-level data used are aggregated at the three-digit NAICS industry level, resulting in 21 separate industries for the analysis.

The industry-level dataset includes both the number of exporters and the dollar volume of exports by industry, using the North American Industry Classification System (NAICS) industry

categories. For each industry, the firms are divided into firm size categories based on the number of employees, and a further distinction is made between manufacturing and non-manufacturing firms. For this study, we focus on the total dollar volume of exports rather than the number of exporting firms because the number of identifiable exporting firms in the dataset appears to be volatile, suggesting notable measurement error. While we did estimate the same relationships for the subset of manufacturing firms, the results were similar, but weaker, likely attributable to the much smaller sample of manufacturing firms. Consequently, we do not report results for the manufacturing subsample of exporting firms. The state-level dataset also includes the total number of exporters as well as the dollar volume of exports. However, because of the volatility in the number of exporters noted above, we chose to focus solely on the dollar volume of exports. Unfortunately, for this dataset, we are limited in the extent to which we can investigate differences across firm size classes because this dataset contains only two firm size classes: fewer than 500 employees and 500 or more employees.

Compustat data are used to construct the measure of external finance dependence (EFD). The remaining databases are used to construct alternative measures of bank characteristics. For the national industry-level analysis, the individual bank balance sheet information is taken from the Call Reports to construct measures of aggregate bank health. For the analysis of the export data disaggregated by state, the Call Reports also are used to create measures of bank characteristics at the state level. Construction of the state-level bank characteristics requires the SOD data to identify bank operations in each state for multistate banks.

V. Modeling Approach

The key variable in this study is the SME share of the dollar value of total exports. While exports generally were affected adversely by the financial crisis, it is expected that smaller firms would be hit harder than larger firms due to the greater reliance of smaller firms on bank finance and the general perception that smaller firms expose lenders to greater risk. Thus, as credit availability deteriorates and as lenders undertake a flight to quality, smaller exporting firms might be expected to suffer the brunt of the credit pullback. This would produce a differential effect on the export volumes of SMEs compared with large firms. In addition, using the small firm share of the total dollar value of exports rather than the change in the small firm dollar value of exports avoids having to control explicitly for fluctuations in the demand for exports across time, which could become quite complicated because export demand would depend, among other things, on the general level of economic activity in the many countries to which U.S. firms export.

Industry-level analysis

For the analysis based on the ITAED disaggregated by industry at the national level, the basic equation to be estimated on panel data for the individual industries (k)[3] is:

$$SHSME_{k,t} = Constant + \sum a_i \, EFD_k * CA_{i,t-1} + b_{1,t} DTIME_t + b_{2,k} DINDUSTRY_k + \varepsilon_t, \quad (1)$$

[3] See Table 1 for a list of industries.

where SHSME is the SME share of the dollar volume of total exports in industry k, EFD is a measure of external finance dependence of industry k, and CA_i is a vector of measures of credit availability that are not industry specific.

The equation also contains sets of both time (DTIME) and industry (DINDUSTRY) fixed effects. The time fixed effects will control for general macroeconomic conditions, including the financial environment, obviating the need to include the measures of credit availability (CA) as separate explanatory variables. Similarly, the industry fixed effects will control for systematic differences across industries, including external finance dependence, obviating the need to include the EFD measure as a separate explanatory variable.

Three alternative measures of SHSME are considered to investigate the extent to which the effect on SMEs is greater for smaller firm sizes within the set of SMEs. The thresholds for the alternative size cutoffs for "small businesses" are firms with fewer than 20 employees (0 to 19), fewer than 100 employees (0 to 99), and fewer than 500 employees (0-499). The expectation is that the smaller the employee size threshold for firms, the more sensitive are small firm export shares to bank health problems. The industries are based on the NAICS 3-digit industry codes. The sample includes 21 industries, as shown in Table 1.

The industry-specific external finance dependence measures (EFD) are based on Rajan and Zingales (1998). For a firm, the external finance dependence measure is calculated as:

EFD = (Capital expenditures – Operating cash flow) / Capital expenditures,

where Operating cash flow is measured as: Operating cash flow = Income before extraordinary items (cash flow) + Depreciation and amortization (cash flow) + Deferred taxes (cash flow) +

Equity in net loss (earnings) + Sale of property, plant and equipment and investments (gain) + Funds from operations (other).If values for all of these components are not available, then an alternative formula is used:

Operating cash flow = Funds from operations (total) + Increase in accounts payable (trade) + Decrease in inventories (total) + Decrease in receivables (trade).

The individual firm data are from Compustat. For each firm, EFD is constructed using the firm's Capital expenditures and Operating cash flow summed over the period from 1980 to 2010. To be included, a firm must be present in Compustat for more than 10 years prior to inclusion. The EFD for an industry is the median value of the EFDs for all the firms in that industry. At the firm level, a positive value indicates that the firm's capital expenditures exceed the firm's ability to cover them from its operating cash flow, requiring the firm to rely on external sources of funds. For example, an EFD value of 0.3 would indicate that the firm would not be able to cover 30 percent of its investment expenditures from its own operating cash flow. In contrast, a negative value indicates that the firm has sufficient operating cash flow to fully fund its investment expenditures internally.

The vector of credit availability measures includes an interest rate spread and measures of bank health. The interest rate spread is the Baa-Aaa spread that reflects general credit conditions and the pricing of credit risk, rather than being bank specific. An increase in this spread would be expected to be associated with a reduction in credit availability to riskier firms. Given that smaller firms are typically deemed to be riskier compared to larger firms, the small firm share of exports would be expected to decline with an increase in this interest rate spread.

The bank health variables are constructed at the national level. They include indicators based on the lower tail of the distribution of the measures of individual bank health, rather than

solely on measures of central tendency, such as the mean or median.[4] The idea is that the banks in the worst financial shape are the ones most likely to curtail the supply of bank loans. One such measure is based on the FDIC's problem bank list and is constructed as the ratio of the total assets of the banks on the problem bank list to total assets of FDIC-insured banks. The expectation is that a higher share of problem bank assets will be associated with a reduction in the small firm share of exports. The remaining measures of bank health are constructed from individual bank Call Report data for all domestic commercial banks. Three types of measures are considered: risk-based capital (Riskcap) ratios, liquidity (Liquid) ratios, and nonperforming loan (NPL) ratios. In each case, all domestic commercial banks are ordered by their values of the variable, with the order going from lowest to highest for capital ratios and liquidity ratios, and highest to lowest for the NPL ratio, given that NPL ratio values are associated with weaker bank health. Thus, for each of the three bank health measures, the banks are ordered from those with the weakest bank health to those that are the healthiest. Better bank health, in the form of a higher capital ratio, a higher liquidity ratio, or a lower NPL, is anticipated to benefit small, bank-dependent firms relative to larger firms.

Three thresholds are considered: the values at the median (50^{th} percentile), the 25^{th} percentile, and the 10^{th} percentile of total domestic commercial bank assets. For example, to construct the measures for the capital ratio, all banks are ordered by the value of their capital ratio. Then we go up to the 10^{th} percentile of total assets and select the capital ratio value of the bank located at that point in the distribution as our 10^{th} percentile measure of the capital ratio. That is, the percentiles are based on the percentile of bank assets rather than on the percentile of

[4] See the next section for a description of the state-level analysis.

the number of banks that would equally weight each bank regardless of size and its share of the market.

The capital ratio is the tier 1 risk-based capital ratio used to satisfy bank capital regulations, defined as tier 1 capital divided by risk-weighted assets. The liquidity (Liquid) ratio is constructed as the bank's liquid assets as a share of total bank assets, where liquid assets include the sum of federal funds sold less federal funds purchased, securities purchased under agreements to resell less securities sold under agreements to repurchase, held-to-maturity and available-for-sale securities, and cash and balances due from depository institutions. The NPL ratio is constructed as nonperforming loans divided by total loans, where nonperforming loans are equal to loans past due 90 days or more and still accruing, plus nonaccrual loans.

Alternative measures of the capital ratios, liquidity ratios and NPL ratios are calculated for a subset of banks that excludes both the largest and smallest banks. This is done for two reasons. First, some bank characteristics, such as capital ratios and liquidity ratios, differ systematically across bank size classes, with larger banks tending to maintain, on average, lower capital ratios and lower liquidity ratios. Thus, the values of the bank health measures in the lower tail of the distribution across banks will be disproportionately affected by the largest banks. Second, the health of the very largest banks may not be particularly relevant for small firms to the extent that smaller firms tend to engage in relationship borrowing with small and mid-sized banks. Moreover, the smallest banks may not be particularly relevant for exporting firms, insofar as these firms may require services, such as foreign exchange, cross-border payments clearance, and cross-border payment guarantees, typically not provided directly by the smallest banks. The alternative set of banks that excludes the largest and smallest banks is composed of banks with a

value of total real assets from $100 million to $5 billion, using the GDP implicit price deflator to convert nominal to real asset values.

Table 1 contains the list of the 21 3-digit NAICS industries used in the study, with the industries ordered by the value of their external finance dependence (EFD) measure from least dependent to most dependent. In addition to showing the values of the industry EFD measure, the table also contains the mean values of the shares of the total dollar value of exports for each of four firm size categories: fewer than 20 employees, 20 to 99 employees, 100 to 499 employees, and 500 or more employees. Large firms, those with 500 or more employees, account for most of the export volume, with Wood Products being the only industry in which large firms have less than a 50 percent share.

Table 2 contains the summary statistics for the explanatory variables used in the industry-level regression analysis. Table A1 in the Appendix lists the descriptions and sources for each of the variables used in the industry-level regression analysis. The top panel contains the summary statistics for the full set of domestic commercial banks, while the lower panel contains the summary statistics for the bank health measures once the very largest and smallest banks are eliminated. Table 3 contains the correlation matrix of the explanatory variables based on the full national sample of commercial banks. The relatively high correlations among many of these variables are not surprising, given that they are alternative indicators of bank health. However, these correlations may make it difficult to isolate the individual effects of the variables when they are entered in the regression at the same time.

State-level analysis

For the analysis based on the ITAED disaggregated by state, the basic equation to be estimated on panel data for the individual states (j) is:

$$SHSME_{j,t} = Constant + b_1 H_{j,t} + b_{2,t} DTIME_t + b_{3,j} DSTATE_j + \varepsilon_t, \qquad (2)$$

where SHSME is the SME share of the total dollar volume of exports for firms headquartered in state j, and H represents alternative measures of state bank health. The equation also contains both state (DSTATE) and time (DTIME) fixed effects. The state fixed effects will control for systematic state differences, including industry mix, and the time fixed effects will control for the general macroeconomic environment. The state health variables include the same three bank health indicators used in the industry-level analysis--the capital ratio, the liquidity ratio and the nonperforming loan ratio--except that the measures are constructed at the state level rather than at the national level.

Measuring state bank health is complicated by the fact that many banks branch across state borders, so it is inappropriate to associate a bank solely with the state in which its headquarters is located. Thus, branch data from the Summary of Deposits are used to identify the states in which each bank operates. Unfortunately, bank lending operations are not identified by state, only their deposits. Thus, to construct state-level measures of bank health, each bank's share of deposits is assumed to represent that bank's share of activities in that state. Because banks report balance sheet information only at the bank level, not at the branch level, a bank's values for its capital ratio, liquidity ratio and NPL ratio are used to calculate the state-level bank health measures. The distributions for each bank health measure for a given state are formed by ordering the banks that operate in that state by the value of their bank health measure, and

assigning each bank a weight equal to its share of the state's deposits. Similar to the method used for the national bank health measures for the industry-level analysis, the median, 25th, and 10th percentiles of the distribution of the state's bank health variables are then equal to the value of the bank located at the median, 25th, and 10th percentiles of the distribution of the state's deposits, respectively.

In addition to constructing these bank health measures for all domestic commercial banks in a state, we also construct the measures for three bank size classes to allow for the possibility that banks of different sizes may have differing importance in affecting the performance of SME exporters relative to large exporting firms. The bank size classes are based on the size of the entire bank rather than on the size of the bank's branch deposit operations in the state. The three size classes considered are: small, defined as banks with total assets less than $100 million; medium, defined as banks with total assets from $100 million to $5 billion; and large, defined as banks with total assets of $5 billion or more. Bank assets are in real terms, having been deflated using the GDP implicit price deflator. Capital ratios, liquidity ratios, and NPL ratios are defined in the same way as for the industry-level analysis. Table A2 in the Appendix lists the descriptions and sources for each of the variables used in the state-level regression analysis.

The state-level analysis includes 36 states. States are omitted from the sample for two reasons. First, to reduce noise in the small firm exporter share measure, states with fewer than 1,000 total exporting firms in any year have been eliminated. The 11 states eliminated are Alaska, Delaware, Hawaii, Idaho, Montana, New Mexico, North Dakota, South Dakota, Vermont, West Virginia, and Wyoming. Second, some states had few banks in the bank size classes, allowing a single bank to be represented in the bank health characteristics of that state. Thus, to minimize idiosyncratic fluctuations in the state-level bank aggregate statistics, states

with fewer than two individual banks in each of the three bank size classes were omitted. This eliminated three additional states: Maine, New Hampshire, and Rhode Island. While it would be interesting to examine further distinctions among banks, such as whether a bank is a member of a multibank holding company or whether a bank is publicly traded, the extensive consolidation of the banking industry that results in the small number of banks in size classes by state limits our ability to make such additional distinctions.

VI. Empirical Results: Industry-Level Data

Table 4 contains the first pass at explaining the small firm dollar share of national export volume disaggregated by industry. As noted earlier, the strong correlations of the alternative measures of bank health preclude entering them as explanatory variables at the same time. Thus, as a first pass, the explanatory variables are entered one at a time, along with the set of industry and time fixed effects. As noted above, each explanatory variable is interacted with EFD, with the anticipated sign on the estimated coefficients for capital ratio and liquidity ratio measures being positive, and those for the nonperforming loan ratio and problem bank ratio being negative. That is, the more dependent the industry on external finance, the greater are the adverse consequences for small exporting firms relative to large exporting firms of a deterioration in bank health. In the case of the Baa-Aaa interest rate spread, the predicted sign of the estimated coefficient is negative because a higher credit risk premium embedded in interest rates is anticipated to adversely affect small firms more than larger firms.

With the exception of the liquidity ratio measures, most of the estimated coefficients have the predicted sign, indicating that a deterioration in bank health, or an increase in the interest rate spread, adversely affects smaller firms' exports more than larger firms' exports, with stronger

effects for industries more dependent on external finance. For the smallest firms, those with fewer than 20 employees, six of the 11 estimated coefficients are statistically significant at the 5 percent or better level, and in each instance have the predicted sign. While the interest rate spread, the share of problem bank assets, and all three of the NPL ratios have significant effects, only the 10th percentile measure for the capital ratio measures is significant, although all three capital ratio measures have the predicted positive sign. However, none of the estimated coefficients on the liquidity ratio measures is significant, and each of the three has a sign that is opposite that predicted.

When the size threshold for exporting firms is raised to include all firms with fewer than 100 employees, much the same story emerges. The difference is that the estimated coefficient on the 10th percentile measure of the liquidity ratio is now significant, although it has a negative sign rather than the predicted positive sign. However, all of the statistically significant effects disappear when the firm size threshold is raised to include firms with fewer than 500 employees, although four remain significant at the 10 percent level. Thus, it appears that the export shares of the smaller firms, those with fewer than 100 employees, are sensitive to alternative measures of bank health, with that sensitivity increasing (in absolute value) with the average dependence of the firm's industry on external finance.

The Table 5 regression specifications differ from those in Table 4 by including the interest rate spread in addition to a single measure of bank health in each regression. The results are consistent with those in Table 4 for the interest rate spread. However, few of the bank health measures have estimated coefficients that are statistically significant, and even then may not have the predicted sign, as would be expected given the correlations shown in Table 3. Finally,

as in Table 5, the significant effects tend to disappear when the firm size threshold is raised to fewer than 500 employees.

Table 6 specifications repeat those in Table 5. The difference is that the bank health measures are constructed for a subset of banks, omitting the very largest and smallest banks which are likely to be less relevant for small exporting firms. For the smallest firms, those with fewer than 20 employees, the number of estimated coefficients on the bank health measures that are statistically significant rises from none to six, each with the predicted sign. Two other estimated coefficients are significant at the 10 percent level, leaving only that for the median nonperforming loan measure not significant at the 10 percent or better level. On the other hand, only two of the estimated coefficients on the interest rate spread are now statistically significant, down from six of the nine corresponding coefficients in Table 5. This suggests that the focus on medium-sized banks provides a better indicator of the relevant measure of bank health for exporting firms. Moreover, all nine specifications in Table 6 have a better overall fit than the corresponding regressions in Table 5.

When the firm size threshold is raised to fewer than 100 employees, a similar story emerges. Six of the estimated bank health coefficients are statistically significant at the 5 percent or better level, and again, the bank health measures now dominate the interest rate spread measure. Finally, using the fewer than 500 employee threshold, none of the interest rate spread estimated coefficients and only one of the estimated bank health coefficients is statistically significant at the 5 percent level, consistent with the previous evidence that bank health becomes less relevant for small firm export shares as firm size increases.

VII. Empirical Results: State-Level Data

Table 7 contains the number of SME exporters for each of the 36 states included in the state-level regression analysis. As might be expected, variation across states is quite large, with high numbers for populous states such as California, Florida, New York, and Texas, and relatively low numbers for states such as Mississippi, Arkansas, Kansas, and Nebraska. The table also shows substantial variation across time in the number of SME exporters for many states. Table 8 contains the SME shares of the dollar volume of total exports for each of the 36 states. Substantial variation across states, and across time for a given state, is apparent. Table 9 contains the summary statistics for the state-level measures of the SME share of the dollar volume of total exports and the bank health measures. The top panel contains the data for the full sample of banks, while the next three panels contain the data disaggregated into small, medium, and large bank size classes.

Table 10 contains the regression results. As with the industry-level analysis, the bank health measures tend to be highly correlated, both across the dimension of category (capital ratio, liquidity ratio, and nonperforming loan ratio) and across bank size classes. Thus, each regression shown in the table includes only a single measure of bank health. The top panel of Table 10 contains the results using aggregate bank health measures not disaggregated by bank size classes. None of the estimated coefficients are statistically significant. For the capital ratio measures, the median has the highest level of significance and has the predicted positive sign. All three of the liquidity ratio measures have the positive predicted sign, with that for the median measure close to significance at the 10 percent level. For the NPL ratio measures, only that for the 25^{th} percentile measure has the expected negative coefficient, although none of the three coefficients are even close to being statistically significant.

The next three panels contain the results for bank health measures for small, medium, and large bank classes. None of the estimated coefficients for small or medium-sized banks are statistically significant. In contrast, for the large bank class, both the median capital ratio measure and the median NPL ratio measure are significant with the predicted sign, indicating that a deterioration in the health of large banks adversely impacts SME exporters more than large exporters.

What might explain the weak results for the state-level analysis? First, the small firm aggregate is available only for a firm size of fewer than 500 employees. Recall that in the industry-level analysis, the statistically significant results were associated with the firm size classes of fewer than 20 employees and fewer than 100 employees. Thus, finding predominately statistically insignificant estimated coefficients for the state-level analysis for firms with fewer than 500 employees is consistent with the industry-level analysis. Moreover, the fact that the only significant effects emanate from median values, not the 25^{th} or 10^{th} percentile tails of the distributions, may be related to the larger average size of the SME classification used for the state-level analysis.

VIII. Concluding Comments

While the recent collapse in international trade makes this study particularly timely, it also highlights the importance of acquiring a better understanding of the role played by credit availability in international trade generally, as well as its relative impact on SME exporters. With an improved understanding of the mechanisms underlying trade finance as applied to SME exporters relative to large firm exporters, policymakers will have a clearer picture of the industry-specific and regional impacts of financial crises based on the sensitivity of firms in

specific industries and on the composition of banks in particular geographic locations. They also will gain a better understanding of the role of credit availability shocks in magnifying the effects of declines in the demand for exports. Given the importance of SMEs in job creation, as well as the problems emanating from the chronic U.S. trade deficits, how and to what extent SME exporters are adversely affected by frictions in the credit markets is an important public policy issue.

This study investigates the role of bank health in the operations of U.S. exporting firms across two dimensions. First, it looks at industry-level data to improve our understanding of differences across industries related to the extent to which firms in those industries are more or less reliant on external finance. Second, the study considers the role of local bank health in the operations of small exporting firms by using state-level data.

The empirical results are consistent with differential effects on SME exporters relative to large firm exporters operating through the trade finance channel. In particular, the small firm share of the dollar volume of total exports is adversely affected by a deterioration in bank health, using a number of alternative indicators of bank health. Moreover, the adverse impact is more pronounced for firms in industries that are more reliant on external finance, such as chemicals and textile mill products. While the effects are prevalent for firms with fewer than 100 employees, once the small firm size threshold is raised to the small firm upper limit of less than 500 employees, the effects relative to large firms tend to dissipate.

Consistent with the industry-level results for SMEs with fewer than 500 employees, the state-level analysis finds few statistically significant relationships between state-level bank health and the state's small firm share of the dollar volume of total exports. One can only speculate about whether stronger results would have emerged had data been available to

investigate state-level small firm export share performance based on smaller firm size classes. Still, both the median capital ratio and the median NPL ratio for large banks do have significant effects of the predicted sign on the small firm export share, indicating that local bank health does matter.

This study finds that small exporting firms are affected more by a deterioration in bank health than are larger exporting firms. Moreover, it appears that smaller exporting firms, here firms with fewer than 100 employees, suffer the most. These findings suggest that policies to aid small businesses when bank credit availability is impaired should place particular emphasis on smaller SMEs. In fact, given that we have reason to believe that exporting firms are more sensitive to bank health compared with firms producing for the domestic market, a program supporting credit to smaller exporting firms may provide the greatest "bang per buck" among focused small business lending guarantee programs when bank health weakens and the availability of credit is impaired.

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Tables

Table 1: Distribution of the Dollar Value of Exports by Industry and Firm Size, 2009

				Mean Value of Export Shares			
Industry Name	NAICS Code	EFD	Total, All Firms	< 20 Employees	20 – 99 Employees	100 – 499 Employees	500+ Employees
LEATHER AND ALLIED PRODUCTS	316	-1.17	1.00	0.19	0.08	0.12	0.61
APPAREL AND ACCESSORIES	315	-0.41	1.00	0.22	0.12	0.16	0.50
BEVERAGES AND TOBACCO PRODUCTS	312	-0.40	1.00	0.10	0.05	0.08	0.77
FURNITURE AND FIXTURES	337	-0.25	1.00	0.19	0.09	0.12	0.60
MACHINERY, EXCEPT ELECTRICAL	333	-0.14	1.00	0.13	0.07	0.10	0.70
PRINTED MATTER AND RELATED PRODUCTS	323	-0.12	1.00	0.15	0.08	0.17	0.60
FABRICATED METAL PRODUCTS, NESOI	332	-0.07	1.00	0.14	0.09	0.13	0.64
FOOD AND KINDRED PRODUCTS	311	-0.04	1.00	0.21	0.12	0.11	0.56
MISCELLANEOUS MANUFACTURED COMMODITIES	339	-0.03	1.00	0.27	0.09	0.10	0.55
PLASTICS AND RUBBER PRODUCTS	326	-0.01	1.00	0.13	0.07	0.12	0.68
COMPUTER AND ELECTRONIC PRODUCTS	334	0.00	1.00	0.12	0.05	0.09	0.74
TRANSPORTATION EQUIPMENT	336	0.07	1.00	0.09	0.03	0.04	0.84
NONMETALLIC MINERAL PRODUCTS	327	0.17	1.00	0.11	0.07	0.10	0.73
PRIMARY METAL MANUFACTURING	331	0.20	1.00	0.11	0.10	0.11	0.68
ELECTRICAL EQUIPMENT, APPLIANCES, AND COMPONENTS	335	0.20	1.00	0.11	0.06	0.10	0.74
TEXTILES AND FABRICS	313	0.20	1.00	0.19	0.08	0.13	0.61
WOOD PRODUCTS	321	0.24	1.00	0.28	0.16	0.19	0.37
PAPER	322	0.25	1.00	0.11	0.07	0.09	0.73
PETROLEUM AND COAL PRODUCTS	324	0.37	1.00	0.10	0.08	0.11	0.71
TEXTILE MILL PRODUCTS	314	0.56	1.00	0.16	0.10	0.11	0.62
CHEMICALS	325	0.96	1.00	0.11	0.04	0.07	0.78

EFD = External finance dependence. For example, an EFD value of 0.3 indicates an inability to cover 30 percent of the investment expenditures from operating cash flow, while a negative EFD value indicates operating cash flow sufficient to fully fund investment expenditures internally.

Sources: U.S. Department of Commerce, International Trade Administration Exporter Database, and

Compustat for calculation of EFD.

Table 2: Summary Statistics, Bank Health Measures, Industry-Level Analysis

	Min	Median	Mean	Max	SD
Full Set of Domestic and Commercial Banks					
ShareExp (< 20)	0.058	0.142	0.154	0.314	0.059
ShareExp (< 100)	0.078	0.218	0.235	0.463	0.084
ShareExp (< 500)	0.129	0.338	0.347	0.659	0.110
interest diff	0.680	1.160	1.326	3.380	0.806
problem bank assets	0.0006	0.0033	0.0038	0.0115	0.0033
Riskcap_50	0.083	0.087	0.087	0.092	0.003
Riskcap_25	0.077	0.082	0.080	0.082	0.002
Riskcap_10	0.066	0.075	0.074	0.078	0.003
Liquid_50	0.170	0.197	0.190	0.216	0.016
Liquid_25	0.123	0.150	0.144	0.162	0.012
Liquid_10	0.067	0.081	0.084	0.105	0.013
NPL_50	0.004	0.010	0.012	0.034	0.009
NPL_25	0.009	0.015	0.016	0.034	0.008
NPL_10	0.012	0.019	0.021	0.043	0.009
	$100 Million < Total Bank Assets < $5 Billion				
Mid-sized Domestic and Commercial Banks					
Riskcap_50	0.105	0.109	0.109	0.113	0.003
Riskcap_25	0.095	0.098	0.097	0.099	0.001
Riskcap_10	0.088	0.092	0.091	0.093	0.002
Liquid_50	0.167	0.224	0.215	0.258	0.035
Liquid_25	0.107	0.145	0.146	0.182	0.026
Liquid_10	0.054	0.094	0.093	0.122	0.023
NPL_50	0.004	0.007	0.007	0.016	0.004
NPL_25	0.008	0.012	0.013	0.033	0.008
NPL_10	0.013	0.019	0.023	0.058	0.014

NPL = Nonperforming loan ratio
See Appendix Table A1 for variable names.
Source: FDIC Call Report Data

Table 3: Correlation Matrix, Industry-Level Analysis

	interest diff	problem banks assets	Riskcap_50	Riskcap_25	Riskcap_10	Liquid_50	Liquid_25	Liquid_10	NPL_50	NPL_25	NPL_10
interest diff		0.92	0.11	0.14	-0.98	0.58	0.24	0.54	0.98	0.96	0.97
problem bank assets			0.21	0.21	-0.84	0.79	0.40	0.44	0.97	0.95	0.88
Riskcap_50				0.07	-0.15	0.19	-0.10	0.10	0.09	0.14	-0.01
Riskcap_25					-0.19	0.17	-0.50	0.58	0.11	0.03	0.03
Riskcap_10						-0.43	-0.09	-0.57	-0.93	-0.91	-0.94
Liquid_50							0.59	0.31	0.68	0.61	0.46
Liquid_25								-0.45	0.37	0.39	0.26
Liquid_10									0.45	0.35	0.39
NPL_50										0.98	0.96
NPL_25											0.96
NPL_10											

N =166
NPL = Nonperforming loan ratio
See Appendix Table A1 for variable names.
Source: FDIC for total assets of problem banks and call reports.

Table 4: Determinants of Small Firm Export Shares, Industry-level Analysis

		EFD Interacted With:										
		interest diff	problem bank assets	Riskcap_50	Riskcap_25	Riskcap_10	Liquid_50	Liquid_25	Liquid_10	NPL_50	NPL_25	NPL_10
< 20 Employees	**Estimate**	-0.015***	-2.689**	1.336	1.303	3.278***	-0.329	-0.143	-0.583*	-1.292***	-1.284***	-1.326***
		(0.001)	(0.018)	(0.325)	(0.539)	(0.002)	(0.177)	(0.648)	(0.052)	(0.002)	(0.006)	(0.001)
	R-squared	90.046	89.7	89.344	89.298	89.975	89.41	89.284	89.561	89.975	89.842	90.105
< 100 Employees	**Estimate**	-0.02***	-3.141**	2.614	1.124	4.5***	-0.343	-0.087	-0.857**	-1.655***	-1.562**	-1.738***
		(0.001)	(0.035)	(0.141)	(0.686)	(0.001)	(0.283)	(0.832)	(0.029)	(0.003)	(0.011)	(0.001)
	R-squared	91.506	91.112	90.963	90.829	91.483	90.895	90.821	91.134	91.398	91.243	91.535
< 500 Employees	**Estimate**	-0.013*	-1.751	2.224	-2.125	3.153*	-0.08	0.393	-0.884*	-0.996	-0.867	-1.098*
		(0.086)	(0.337)	(0.304)	(0.53)	(0.069)	(0.837)	(0.432)	(0.064)	(0.145)	(0.251)	(0.089)
	R-squared	92.295	92.179	92.187	92.149	92.315	92.129	92.162	92.321	92.248	92.202	92.292

Note: p-values in parentheses below estimated coefficients. Each equation also contains a set of industry dummy variables and a set of time dummy variables. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

N =166
NPL = Nonperforming loan ratio
EFD = External finance dependence
See Appendix Table A1 for variable names.
Source: International Trade Administration Exporter Database; FDIC for total assets of problem banks and call reports; St. Louis FRB for bond yields; Compustat for EFD calculation.

Table 5: Expanded Determinants of Small Firm Export Shares, Industry-level Analysis

		EFD Interacted With:									
		problem bank assets	**Riskcap_50**	**Riskcap_25**	**Riskcap_10**	**Liquid_50**	**Liquid_25**	**Liquid_10**	**NPL_50**	**NPL_25**	**NPL_10**
< 20 Employees	**interest diff**	-0.03*** (0.009)	-0.015*** (0.001)	-0.015*** (0.001)	-0.023 (0.287)	-0.017*** (0.003)	-0.015*** (0.001)	-0.014** (0.011)	-0.029 (0.253)	-0.032** (0.044)	0.001 (0.966)
	Estimate	4.222 (0.138)	1.837 (0.163)	2.284 (0.27)	-2.061 (0.687)	0.176 (0.544)	0.092 (0.768)	-0.069 (0.844)	1.388 (0.559)	1.824 (0.256)	-1.39 (0.371)
	R-squared	90.135	90.116	90.063	89.985	90	89.98	89.976	89.998	90.068	90.032
< 100 Employees	**interest diff**	-0.051*** (0.001)	-0.021*** (0.001)	-0.02*** (0.001)	-0.018 (0.537)	-0.024*** (0.001)	-0.02*** (0.001)	-0.018** (0.014)	-0.062* (0.067)	-0.059*** (0.004)	-0.004 (0.868)
	Estimate	8.535** (0.021)	3.293* (0.055)	2.417 (0.372)	0.458 (0.945)	0.377 (0.319)	0.232 (0.569)	-0.212 (0.647)	3.944 (0.203)	4.229** (0.043)	-1.411 (0.488)
	R-squared	91.774	91.673	91.494	91.444	91.506	91.464	91.457	91.546	91.699	91.474
< 500 Employees	**interest diff**	-0.041** (0.032)	-0.014* (0.065)	-0.012 (0.101)	0.011 (0.762)	-0.018** (0.05)	-0.015** (0.05)	-0.007 (0.41)	-0.068 (0.106)	-0.056** (0.03)	-0.008 (0.781)
	Estimate	7.479 (0.108)	2.671 (0.216)	-1.341 (0.693)	5.636 (0.501)	0.46 (0.332)	0.627 (0.219)	-0.617 (0.285)	5.192 (0.181)	4.58* (0.08)	-0.412 (0.871)
	R-squared	92.385	92.325	92.247	92.264	92.292	92.324	92.303	92.34	92.411	92.24

Note: p-values in parentheses below estimated coefficients. Each equation also contains a set of industry dummy variables and a set of time dummy variables. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

N =166
EFD = External finance dependence
See Appendix Table A1 for variable names.
Source: International Trade Administration Exporter Database; FDIC for total assets of problem banks and call reports; Compustat for EFD calculation.

Table 6: Determinants of Small Firm Export Shares, Industry-level Analysis, Subsample of Medium-Sized Banks

		EFD Interacted With:								
		Riskcap_50	**Riskcap_25**	**Riskcap_10**	**Liquid_50**	**Liquid_25**	**Liquid_10**	**NPL_50**	**NPL_50**	**NPL_10**
< 20 Employees	**interest diff**	-0.007 (0.2)	0 (0.976)	0.015 (0.362)	-0.009* (0.055)	-0.011** (0.028)	-0.011** (0.026)	0.005 (0.827)	0.024 (0.316)	0.028 (0.183)
	Estimate	4.346*** (0.01)	10.091** (0.014)	16.164* (0.061)	0.276** (0.016)	0.354** (0.017)	0.406** (0.014)	-4.42 (0.354)	-4.083* (0.099)	-2.551** (0.038)
	R-squared	90.447	90.406	90.229	90.391	90.386	90.406	90.036	90.172	90.286
< 100 Employees	**interest diff**	-0.008 (0.257)	0.002 (0.842)	0.015 (0.489)	-0.011* (0.097)	-0.012** (0.045)	-0.013** (0.04)	0 (0.998)	0.035 (0.26)	0.046* (0.093)
	Estimate	6.497*** (0.003)	14.964*** (0.005)	18.792* (0.096)	0.478*** (0.001)	0.62*** (0.001)	0.694*** (0.001)	-4.453 (0.476)	-5.779* (0.074)	-3.916** (0.015)
	R-squared	91.972	91.919	91.617	92.071	92.075	92.077	91.476	91.643	91.811
< 500 Employees	**interest diff**	-0.005 (0.569)	-0.001 (0.919)	-0.008 (0.774)	-0.006 (0.47)	-0.007 (0.362)	-0.008 (0.324)	-0.025 (0.475)	0.003 (0.946)	0.02 (0.557)
	Estimate	4.253 (0.129)	8.008 (0.24)	2.7 (0.849)	0.362* (0.054)	0.477** (0.05)	0.496* (0.069)	2.814 (0.719)	-1.633 (0.688)	-1.979 (0.329)
	R-squared	92.369	92.317	92.24	92.447	92.454	92.425	92.245	92.247	92.292

Note: p-values in parentheses below estimated coefficients. Each equation also contains a set of industry dummy variables and a set of time dummy variables. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

N =166
NPL = Nonperforming loan ratio
EFD = External finance dependence
See Appendix Table A1 for variable names.
Source: International Trade Administration Exporter Database; FDIC for call reports; Compustat for EFD calculation.

Table 7: Number of SME Exporters by State

	2002	2003	2004	2005	2006	2007	2008	2009
AL	2,226	2,257	2,369	1,894	1,896	2,129	2,297	2,214
AR	1,165	1,303	1,434	1,032	1,048	1,148	1,218	1,164
AZ	4,158	4,235	4,784	3,975	4,147	4,814	5,173	4,772
CA	52,078	53,700	55,863	49,148	50,029	53,323	57,461	55,530
CO	3,449	3,547	3,850	3,374	3,618	3,909	4,200	3,974
CT	4,403	4,469	4,517	4,084	4,111	4,460	4,684	4,383
FL	28,706	29,033	32,199	27,048	28,775	31,879	36,533	36,109
GA	7,776	8,158	8,544	6,451	6,765	7,750	8,812	8,365
IA	1,777	1,895	2,018	1,740	1,813	1,987	2,141	2,008
IL	15,143	15,659	15,671	12,359	12,842	13,892	15,170	14,239
IN	4,842	5,110	5,215	4,452	4,616	5,129	5,619	5,400
KS	1,753	1,803	1,849	1,598	1,744	1,894	2,049	1,957
KY	2,374	2,424	2,455	2,091	2,192	2,392	2,595	2,437
LA	2,434	2,551	2,607	1,936	1,998	2,166	2,338	2,209
MA	8,945	9,013	8,956	7,304	7,422	7,933	8,236	7,937
MD	3,614	3,779	3,970	3,066	3,172	3,455	3,799	3,661
MI	10,573	10,827	10,672	8,993	9,265	10,057	10,651	10,169
MN	5,223	5,460	5,476	4,777	5,009	5,574	6,027	5,635
MO	3,536	3,755	3,909	3,238	3,395	3,844	4,000	3,753
MS	1,313	1,220	1,168	787	799	931	981	930
NC	6,624	6,905	7,015	5,829	6,051	6,811	7,284	7,067
NE	1,154	1,166	1,189	842	889	971	1,084	1,033
NJ	13,943	14,267	14,921	12,940	12,988	14,013	15,021	14,406
NV	1,398	1,494	1,574	1,795	1,839	2,006	2,133	2,034
NY	27,973	28,590	29,755	23,248	23,688	25,657	27,265	25,422
OH	10,887	11,309	11,455	9,747	10,024	10,938	11,678	11,102
OK	1,862	1,963	1,994	1,825	1,876	2,070	2,186	2,044
OR	4,187	4,219	4,131	3,570	3,703	4,087	4,384	4,198
PA	10,802	11,031	11,073	9,668	10,028	10,900	11,720	11,013
SC	3,444	3,608	3,679	2,531	2,653	2,933	3,172	3,056
TN	3,867	4,117	4,188	3,226	3,446	3,872	4,135	3,906
TX	24,693	23,216	25,849	19,148	20,121	21,797	24,294	23,792
UT	1,769	1,809	1,915	1,786	1,906	2,117	2,263	2,200
VA	4,641	4,705	4,773	3,733	3,834	4,241	4,650	4,414
WA	8,266	8,451	8,213	6,400	6,664	7,196	7,627	7,193
WI	5,377	5,620	5,612	4,883	5,205	5,637	5,975	5,677

Source: International Trade Administration Exporter Database

Table 8: SME Share of Dollar Volume of Total Exports by State

	2002	2003	2004	2005	2006	2007	2008	2009
AL	18%	19%	23%	17%	15%	21%	21%	23%
AR	23%	22%	23%	19%	16%	15%	17%	15%
AZ	19%	17%	21%	24%	20%	19%	24%	28%
CA	40%	42%	41%	43%	44%	44%	44%	46%
CO	17%	17%	19%	24%	25%	28%	25%	29%
CT	23%	28%	30%	26%	30%	28%	27%	28%
FL	49%	52%	55%	61%	63%	64%	62%	67%
GA	28%	21%	25%	24%	25%	28%	30%	33%
IA	18%	20%	18%	20%	21%	26%	27%	27%
IL	22%	23%	25%	23%	22%	19%	22%	22%
IN	12%	12%	13%	16%	16%	17%	19%	20%
KS	17%	22%	20%	24%	24%	25%	23%	25%
KY	17%	21%	19%	17%	16%	16%	18%	19%
LA	31%	23%	28%	37%	35%	30%	29%	36%
MA	25%	26%	25%	27%	28%	31%	34%	38%
MD	25%	28%	30%	27%	31%	30%	34%	37%
MI	16%	18%	20%	13%	12%	12%	13%	18%
MN	24%	31%	26%	17%	18%	20%	20%	21%
MO	15%	22%	23%	28%	28%	26%	25%	22%
MS	18%	27%	25%	26%	29%	34%	24%	26%
NC	23%	21%	23%	22%	22%	23%	23%	21%
NE	28%	35%	36%	33%	29%	26%	25%	28%
NJ	36%	39%	38%	37%	38%	40%	43%	43%
NV	36%	22%	21%	33%	29%	27%	24%	25%
NY	48%	48%	50%	54%	52%	55%	55%	58%
OH	16%	18%	21%	23%	23%	23%	24%	24%
OK	29%	29%	27%	33%	34%	36%	35%	32%
OR	21%	23%	26%	29%	27%	34%	32%	30%
PA	30%	33%	33%	33%	29%	31%	34%	30%
SC	17%	15%	18%	16%	14%	12%	12%	13%
TN	20%	18%	18%	15%	14%	18%	17%	16%
TX	21%	22%	25%	27%	27%	32%	33%	34%
UT	15%	20%	20%	24%	20%	20%	14%	17%
VA	25%	25%	25%	25%	28%	28%	32%	32%
WA	13%	15%	17%	20%	16%	16%	19%	23%
WI	22%	23%	23%	23%	23%	27%	29%	26%

Source: International Trade Administration Exporter Database

Table 9: Summary Statistics, State-Level Analysis

	Min	Median	Mean	Max	SD
SME_pct	0.118	0.244	0.264	0.671	0.101
Panel - A: All Banks					
Riskcap_50	0.071	0.092	0.094	0.131	0.010
Riskcap_25	0.065	0.083	0.083	0.106	0.009
Riskcap_10	0.061	0.076	0.076	0.097	0.008
Liquid_50	0.077	0.188	0.193	0.358	0.042
Liquid_25	-0.186	0.141	0.137	0.252	0.052
Liquid_10	-0.290	0.105	0.098	0.217	0.065
NPL_50	0.003	0.009	0.011	0.043	0.007
NPL_25	0.003	0.012	0.015	0.048	0.009
NPL_10	0.003	0.016	0.019	0.062	0.011
Panel - B: Total Bank Assets < $100 Million					
Riskcap_50	0.098	0.144	0.146	0.206	0.019
Riskcap_25	0.073	0.117	0.119	0.167	0.015
Riskcap_10	0.004	0.102	0.105	0.167	0.014
Liquid_50	0.047	0.296	0.294	0.588	0.080
Liquid_25	0.020	0.203	0.202	0.387	0.062
Liquid_10	-0.024	0.138	0.141	0.345	0.055
NPL_50	0.000	0.006	0.007	0.056	0.006
NPL_25	0.000	0.015	0.017	0.115	0.012
NPL_10	0.000	0.028	0.031	0.181	0.022
Panel - C: $100 Million < Total Bank Assets < $5 Billion					
Riskcap_50	0.078	0.108	0.110	0.162	0.011
Riskcap_25	0.064	0.098	0.098	0.130	0.009
Riskcap_10	0.057	0.092	0.091	0.113	0.008
Liquid_50	0.023	0.210	0.214	0.398	0.063
Liquid_25	-0.013	0.145	0.149	0.336	0.054
Liquid_10	-0.181	0.100	0.103	0.256	0.056
NPL_50	0.001	0.006	0.008	0.072	0.009
NPL_25	0.002	0.011	0.014	0.088	0.011
NPL_10	0.004	0.018	0.024	0.157	0.022
Panel - D: Total Bank Assets $5 Billion+					
Riskcap_50	0.065	0.085	0.085	0.131	0.009
Riskcap_25	0.065	0.078	0.078	0.102	0.009
Riskcap_10	0.061	0.075	0.074	0.097	0.008
Liquid_50	-0.093	0.173	0.177	0.382	0.052
Liquid_25	-0.186	0.150	0.135	0.293	0.066
Liquid_10	-0.290	0.108	0.106	0.242	0.070
NPL_50	0.003	0.010	0.012	0.043	0.008
NPL_25	0.003	0.013	0.015	0.054	0.009
NPL_10	0.003	0.015	0.018	0.054	0.011

NPL = Nonperforming loan ratio
EFD = External finance dependence
See Appendix Table A2 for variable names

Source: FDIC call reports.

Table 10: Determinants of Small Firm Export Shares, State-level Analysis

Bank Asset Size		Riskcap_50	Riskcap_25	Riskcap_10	Liquid_50	Liquid_25	Liquid_10	NPL_50	NPL_25	NPL_10
All Banks	**Estimate**	0.469	-0.187	-0.0983	0.123	0.0384	0.0299	0.307	-0.357	0.441
		(0.196)	(0.658)	(0.818)	(0.103)	(0.506)	(0.514)	(0.621)	(0.508)	(0.307)
	R-squared	89.2	89.1	89.1	89.3	89.2	89.2	89.1	89.2	89.2
Small (under $100M)	**Estimate**	-0.0975	-0.0619	0.0839	-0.0603	-0.0356	0.0142	-0.266	-0.0725	0.152
		(0.576)	(0.783)	(0.644)	(0.271)	(0.629)	(0.835)	(0.584)	(0.743)	(0.204)
	R-squared	89.1	89.1	89.1	89.2	89.1	89.1	89.1	89.1	89.2
Medium ($100M-<$5B	**Estimate**	0.0963	0.445	0.526	0.119	0.13	0.00869	0.16	0.146	0.0457
		(0.776)	(0.369)	(0.272)	(0.135)	(0.133)	(0.904)	(0.629)	(0.606)	(0.735)
	R-squared	89.1	89.2	89.2	89.2	89.2	89.1	89.1	89.1	89.1
Large ($5B+)	**Estimate**	0.888***	-0.254	-0.486	0.0533	0.0437	0.0188	-1.3**	-0.818*	-0.345
		(0.00536)	(0.502)	(0.267)	(0.315)	(0.323)	(0.646)	(0.0204)	(0.085)	(0.427)
	R-squared	89.5	89.2	89.2	89.2	89.2	89.1	89.4	89.3	89.2

Note: p-values in parentheses below estimated coefficients. Each equation also contains a set of state dummy variables and a set of time dummy variables. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

N =288
NPL = Nonperforming loan ratio
EFD = External finance dependence
See Appendix Table A2 for variable names

Source: International Trade Administration Exporter Database; FDIC call reports.

Appendix

Table A1: Variable Names and Sources, Industry-Level Analysis

Variable	Definition	Source
	Dependent Variables	
ShareExp (<20)	Fraction of dollar volume of total exports attributed to exporters with less than 20 employees	ITAED
ShareExp (<100)	Fraction of dollar volume of total exports attributed to exporters with less than 100 employees	ITAED
ShareExp (<500)	Fraction of dollar volume of total exports attributed to exporters with less than 500 employees	ITAED
	Independent Variables	
interest diff	Interest Rate Difference between Aaa and Baa Moody's Seasoned Corporate Bond Yields	Board of Governors of the Federal Reserve System
problem bank assets	Fraction of total bank assets that belong to problem banks	FDIC
Riskcap_50	Value of risk-based capital ratio corresponding to the median value of total bank assets	FDIC Call Reports
Riskcap_25	Value of risk-based capital ratio corresponding to the 25^{th} percentile of total bank assets	FDIC Call Reports
Riskcap_10	Value of risk-based capital ratio corresponding to the 10^{th} percentile of total bank assets	FDIC Call Reports
Liquid_50	Value of liquidity ratio corresponding to the median value of total bank assets	FDIC Call Reports
Liquid_25	Value of liquidity ratio corresponding to the 25^{th} percentile of total bank assets	FDIC Call Reports
Liquid_10	Value of liquidity ratio corresponding to the 10^{th} percentile of total bank assets	FDIC Call Reports
NPL_50	Value of nonperforming loan ratio corresponding to the median value of total bank assets	FDIC Call Reports
NPL_25	Value of nonperforming loan ratio corresponding to the 25^{th} percentile of total bank assets	FDIC Call Reports
NPL_10	Value of nonperforming loan ratio corresponding to the 10^{th} percentile of total bank assets	FDIC Call Reports

Table A2: Variable Names and Sources, State-Level Analysis

Variable	Definition	Source
	Dependent Variable	
sme_pct	Fraction of dollar volume of total exports attributed to SME exporters	ITAED
	Independent Variables	
Riskcap_50	Value of risk-based capital ratio corresponding to the median value of bank deposits within a state	FDIC Call Reports & Summary of Deposits
Riskcap_25	Value of risk-based capital ratio corresponding to the 25th percentile of bank deposits within a state	FDIC Call Reports & Summary of Deposits
Riskcap_10	Value of risk-based capital ratio corresponding to the 10th percentile of bank deposits within a state	FDIC Call Reports & Summary of Deposits
Liquid_50	Value of liquidity ratio corresponding to the median value of bank deposits within a state	FDIC Call Reports & Summary of Deposits
Liquid_25	Value of liquidity ratio corresponding to the 25th percentile of bank deposits within a state	FDIC Call Reports & Summary of Deposits
Liquid_10	Value of liquidity ratio corresponding to the 10th percentile of bank deposits within a state	FDIC Call Reports & Summary of Deposits
NPL_50	Value of nonperforming loan ratio corresponding to the median value of bank deposits within a state	FDIC Call Reports & Summary of Deposits
NPL_25	Value of nonperforming loan ratio corresponding to the 25th percentile of bank deposits within a state	FDIC Call Reports & Summary of Deposits
NPL_10	Value of nonperforming loan ratio corresponding to the 10th percentile of bank deposits within a state	FDIC Call Reports & Summary of Deposits