

# KAUFFMAN DISSERTATION EXECUTIVE SUMMARY

## KAUFFMAN ENTREPRENEURSHIP SCHOLARS

### KAUFFMAN DISSERTATION FELLOWSHIP

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ESSAYS IN FIRM PERFORMANCE WITH MACROECONOMIC  
IMPLICATIONS

A DISSERTATION  
SUBMITTED TO THE DEPARTMENT OF ECONOMICS  
AND THE COMMITTEE ON GRADUATE STUDIES  
OF STANFORD UNIVERSITY  
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FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

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## **Abstract**

Using novel data from the leading online accounting software in the United States with millions of financial transactions for small businesses, I measure firms' responses to shocks in credit supply during the Great Recession. Bank failures are associated with declines in credit for small firms but not micro firms. In contrast, movements in house prices are associated with credit changes for micro firms but not small firms. This suggests differences in how firms overcome asymmetric information: micro firms appear to depend more on housing collateral and small firms on lending relationships, consistent with the associated costs to lenders.

## Executive Summary

Small businesses are an important part of the American economy - almost 80% of firms in the US have less than 10 employees, and small firms employ about 50% of all workers<sup>1</sup>. The Great Recession saw very high and persistent rates of unemployment, and recent research has linked this phenomenon to the dynamics of small business credit due to their high sensitivity to financing constraints.<sup>2</sup>

These businesses often have difficulty obtaining credit and suffered extensively during the Great Recession. From the Kauffman Firm Survey in 2008, we learn that a third of the firms who applied for new bank credit or renewal of a line of credit faced difficulties or were denied, and 18% of the respondents indicated they did not apply for funding fearing their applications would be rejected.

Given that these firms are particularly sensitive to financing and could have driven aggregate employment, the lack of access to credit for small businesses has become an important topic of interest in recent years. However, the data available to study questions this set of small, privately-owned firms is very limited. Data on the financials of large publicly-listed firms is readily available for shareholders to view, and book-keeping across firms is very standardized and fairly accurate. In contrast, for small, privately-held firms, accounting standards vary across companies and it is hard for researchers to access data of these companies especially in large samples

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<sup>1</sup> See Statistics of US Businesses from the 2012 Census by the US Census Bureau and the speech by Bernanke on July 12, 2010 in Washington, D.C.

<sup>2</sup> See "An overview of the Kauffman Firm Survey: results from the 2004-2007 data" by Alicia Robb, Janice Ballou, David DesRoches, Frank Potter, Zhanyun Zhao and EJ Reedy

to understand macro dynamics. Some notable sources of data for small businesses include the Kauffman Firm Survey and the Survey of Small Business Finances, which track firms' financials including sources of credit with lots of detail. However, given the nature of the data source, data is self-reported, subjecting it to concerns of measurement error, and the sample is small. Although Amadeus and Fame are datasets with large coverage of the UK and Europe, there is no such data source of financial accounts of private firms in the US.

To study the credit of small firms, I use a novel dataset sourced from the largest online accounting software in the US. The software is used by small businesses to record transactions that the software organizes into financial statements for bookkeeping. This provides a large sample of high-frequency financial data for small, privately held firms that can be used to study the dynamics of small business financing during the Great Recession.

Firms in the data sample represent US firms in the population. For both the sample and the population, there is a high concentration of firms at the lower end of the size distribution. For the population, approximately 80% of firms have less than 10 employees, and this is about 70% in the sample. There is also similarity in the distribution of firms across industries in the sample and the population, with 70-80% of firms in the service sector, about 8-10% in retail and construction, and another 5% in manufacturing.

The dataset has a valuable feature for firms to link their banks to the accounting software and import transactions. This can be used to measure links between firms

and banks. I also have information on the location of the business owner. I use this to measure two key credit supply shocks that would impact the credit to small businesses. First, the Federal Deposit Insurance Corporation (FDIC) shut down more than 500 banks during 2007-2013. Small businesses often borrow based on lending relationships with banks. When banks fail, these lending relationships may be disrupted and small business credit may suffer. Second, I use the address of the business owner to look at house price movements in his home location and see how this affects credit for the business.

My work finds that these two channels matter, but there is heterogeneity even within small businesses in how the shocks matter. Small businesses are typically categorized by the Bureau of Labor Statistics into micro and small firms, with micro firms being small businesses with less than 10 employees, and small firms being small businesses that have more than 10 employees. I find that micro firms are not responsive to bank failures while small firms are, and small firms are not responsive to house price movements while micro firms are. In fact, as we move across firm size (measured by the number of employees) within the small businesses in the dataset, the sensitivity of firm credit to house prices monotonically declines whereas the sensitivity of firm credit to bank failures monotonically increases with size.

These results would be consistent with a cost to lenders for solving asymmetric information in small business lending. Micro firms demand lower loan volumes than small firms, and it may be that the costs to lend to micro firms may not justify the costs to the bank of learning about the firm, whereas the costs may be justified for the relatively larger loan volumes that are demanded by small firms.

This mechanism is supported by several additional results for the set of sensitive firms. First of all, the impact of bank failure on small firm credit is temporary. There is a decline of about 30% over the first and second year following the bank failure, but then the effect peters out. This supports a story of frictions related to information in the lending market for small businesses, which temporarily makes it hard for affected firms to find another source of credit. An alternate hypothesis would be that small businesses which were linked to banks that failed had poorer creditworthiness than average, and were *a priori* unable to get credit from banks that were healthy. In this case, there should not be a recovery in firm credit over time following the failure of the insolvent institution. To explore this, I compare firms who faced bank failure between 2007-2013 with firms whose banks did not fail, in 2006 prior to all failures. I find that there are no significant differences in characteristics of firms whose banks failed in the Recession and subsequent years relative to firms whose banks did not fail. I also construct a placebo test, moving the event of bank failure back by 1-2 years (the length of time for which the bank failure affects firm credit). If firms with low creditworthiness are selected by banks which are more likely to fail, then this would show up even before the bank failure, but we don't see this. Thus, the evidence supports that selection is not driving the decline in credit, and the decline in credit effect following bank failure may arise from the disruption in the lending relationship. Second, small firms which have long-standing relationships with a lender that fails have larger declines in credit on average relative to firms which connected relatively recently to a bank that was shut down. Third, small firms which are connected to multiple banks at the time of the failure of the insolvent banks face lower declines in credit following the failure compared to firms which are connected

to only a single bank. These results are consistent with higher credit as banks gather information about the firm, which is lost when the bank fails.

One concern that may come to mind is that banks fail *because* of the small businesses loans on their balance sheets. However, this is very less likely, as small business loans form about 3% of the balance sheet for large firms and about 9% for large banks.<sup>3</sup> Bank failures have been attributed to exposure to the real estate market or toxic assets. Banks may also fail due to contagion effects from being linked to specific institutions.

Turning next to micro firms, which face higher declines in credit growth relative to small firms during the Great Recession and the following years, I find first that micro firm credit is not responsive to bank failures. The question that then arises is what drives the decline in credit for this set of firms. One potential channel that has received a lot of attention<sup>4</sup> is the movements in house prices. The median house price in the US went from its highest point of approximately \$196,000 in 2007 to its lowest point of \$152,000 in 2012. Small business owners often use their personal collateral to borrow for their business, and as house prices rise and fall, the ability of small business owners to borrow for their firm using the house as collateral varies.

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<sup>3</sup> Jayaratne and Wolken discuss this in their paper "How important are small banks to small business lending?: New evidence from a survey of small firms"

<sup>4</sup> Recent papers that study the role of house price movements in small business credit include notable work by Manuel Adelino, Antoinette Schoar and Felipe Severino titled "House Prices, collateral and self-employment", the paper by Thomas Chaney and David Sraer titled "The collateral channel" How real estate shocks affect corporate investment" and work by Michael Greenstone, Alexandre Mas and Hoai-Luu Nguyen titled "Do credit shocks affect the real economy? Quasi-experimental evidence from the Great Recession and normal economic times"

I find that micro firm credit moves with house price movements at the business owner's home location. This result does not hold true for small firms. This would be consistent with micro firms demanding lower levels of credit, which may not be worth the costs to the bank of learning about the firm and lending based on shared information and a lending relationship. However, the bank may be willing to lend based on the value of the house collateral. This collateral can be taken to another lender easily to acquire a new line of credit. This would be consistent with house prices and not bank failures affecting the credit for micro firms.

One concern that arises is that during this period, consumer demand was changing potentially through the channel of house prices as well. As the house prices of customers of the products and services of these firms rise, the consumers become wealthier and demand more of these products and services. This may lead the firm to demand more credit from lenders, confounding the effect of credit supply on new lending to small businesses. Similarly, in the case of bank failure, there might be local economic shocks driven by house prices or other factors which drive both local banks to failure and small firms to demand lower credit. If we do not account for the impact of these local demand shocks from the consumer side, we overestimate the impact of credit supply shocks on the lending to small businesses.

I control for any local economic shocks at a given time and in a given county and also control for any industry trends. In the case of house prices, one strategy is to use "tradable goods" - goods which are shipped to long distances. These are goods for which the house prices of the business owner will affect the credit availability for the firm, but since consumers of the firms products are dispersed, the demand

channel is less likely to be driving the firm's credit. Using tradables, I find that credit supply still moves with local house prices suggesting a role for the credit supply channel.

Lower credit has a real impact on firms. The decline in credit for both micro and small firms is associated with lower revenue by similar amounts, a 2% decline in revenue with a 10% decline in credit. In terms of employment effects, the results vary across firm size. For small firms, there is a decline in employment associated with credit decline, but for micro firms I don't find these effects. This is possibly because micro firms are very small units, often constituted of family members, and may not have much scope to shrink employment. The declines in credit associated with these credit shocks in the Great Recession are fairly large. For micro firms, the decline in credit is up to 13% of revenue for the firm and for small firms it is approximately 8% of revenue.

To summarize, in this paper I use a new dataset on small business financials to study the impact of credit supply shocks on new lending to small businesses during the Great Recession. Using this dataset, which has linkages between firms and banks and detailed address information, I am able to develop measures for *both* banking and housing collateral shocks at the *firm* level for small businesses and thus build a comprehensive picture of the role of different types of credit supply shocks during the Great Recession on small business borrowing.

This paper has important and direct implications for economic policy. Restructuring processes for troubled banks that take information embedded in lending

relationships into account can prevent the loss of credit supply for small firms. Keeping rapid declines in house prices in check can maintain the stability of micro firm credit. Incorporating differential sensitivities of the two sets of firms into forecasting and policy design can inform questions on aggregate dynamics and business cycle effects through the channel of small business credit.