How Much Do Small Businesses Rely on Personal Credit?

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Introduction and Motivation

Small businesses are an important driver of economic activity. A large body of work has shown that the health of small businesses is reliant on access to and the supply of external credit.[1] However, much less is known about how external debt financing interacts with entrepreneurs' personal credit in determining the success of a business.

Anecdotal and survey evidence suggest that many small businesses rely on personal credit to fund their activities. In a 2019 survey of small businesses with at least one employee, 40 percent of respondents reported using both personal and business credit cards to fund their business and 12 percent of respondents reported using personal credit cards only (Small Business Credit Survey, 2019). While this is suggestive of the importance of access to personal credit as a driver of small business activity, ours will be one of the first academic papers to directly measure the effect and consequences of business credit supply shocks on personal credit utilization.

In this project, we estimate the elasticity of an entrepreneur's personal debt to changes in the supply of business credit between 2009 and 2020. Using a detailed novel dataset, we estimate how different kinds of personal debt respond to changes in business credit, including housing debt, credit cards, and other personal loans. In addition, we will examine heterogeneity in these responses along a number of dimensions, including the debt capacity of entrepreneurs and the capital intensity of small businesses, and the effects of total credit supply on the ultimate survival and growth of these businesses. Our findings have implications for how credit supply shocks in the consumer and business sectors interact to affect the aggregate economy, and the role of personal credit in entrepreneurial success.

Relative to existing work linking housing collateral to entrepreneurship (e.g. Adelino, Schoar, and Severino, 2015; Corradin and Popov, 2015; Schmalz, Sraer, and Thesmar, 2017; and Kerr, Kerr, and Nanda, 2019), our research will contribute along two key dimensions. In particular, we will be one of the first papers to directly observe both the personal and business loans of entrepreneurs, allowing us to estimate substitution effects between these two types of debt. We are able to measure not only mortgages but on all types of consumer loans, including credit cards, which are more widely used to fund small business activities. Furthermore, we have rich measures of entrepreneur demographics and creditworthiness and observe all types of business loans including lines of credit, bank loans, trade credit, leases, and UCC filings.

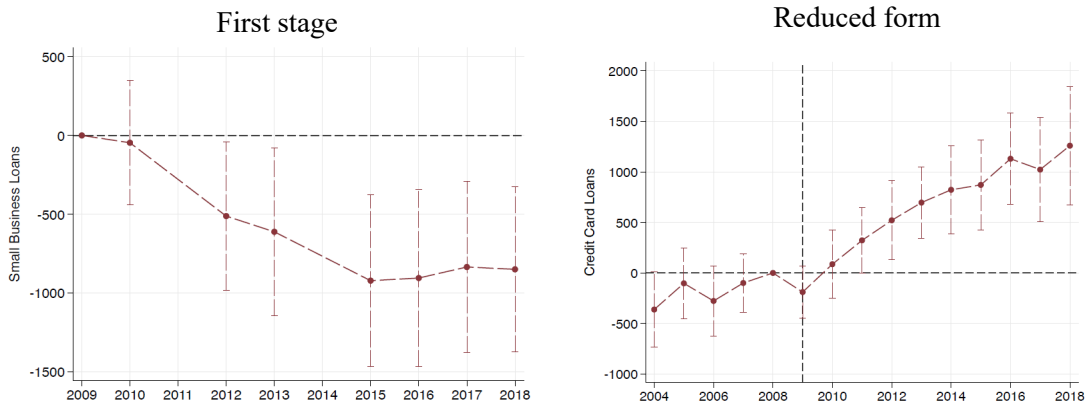
[1] See, for instance, Black and Strahan (2002), Cetorelli and Strahan (2006) Bertrand, Schoar, and Thesmar (2007), and Kerr and Nanda (2009).

Data and Methodology

We bring a rich, novel dataset to bear on understanding the interactions between personal and small business credit. The dataset comes from one of the three major credit reporting agencies in the United States, and includes the personal credit histories of a random one-percent sample of the population that has credit reports between 2004-2018 (about three million individuals). For the subsample of small business owners, this dataset is merged to the credit bureau's business credit registry, which contains tradeline-level data of small business loans, leases, bankruptcies, and other financial activity from 2009 to 2020. Thus, for a given individual, we observe all personal credit lines as well as business tradelines for entrepreneurs. We also observe demographic information such as income, credit scores, age, gender, marital status, and educational attainment.

To identify the effect of supply shocks to business credit on the utilization of personal credit, we follow Chen, Hanson, and Stein (2017), henceforth CHS, and use the fact that the four largest U.S. banks sharply reduced the supply of credit to small businesses relative to other banks starting in 2008 (Figure 1). By exploiting geographic variation in the market share of large banks, this approach yields a persistent local shock to small business lending during our sample period.

Figure 1: First stage and reduced form effects of top-4 bank share



Source: Authors' calculations

We estimate the following specification:

$$BusCredit_{ict} = \sum_{\tau=2009}^{2018} \beta_\tau \times T4DS_c \times 1_{\{t=\tau\}} + X_{ict} + \alpha_i + \alpha_t + \varepsilon_{ict}$$

$$PersCredit_{ict} = \delta \times BusCredit_{ict} + X_{ict} + \alpha_i + \alpha_t + \varepsilon_{ict}$$

Following CHS, we construct a measure $T4DS_c$ of the market share of top 4 banks in 2005 in each county c. We then estimate the first stage in our sample of small business tradelines. The β coefficients represent the effect of top-4 market share on the volume of business credit originations in each year *t* for each firm *i* in county *c*. By including separate β_τ terms for each year, we are able to account for the moderate recovery in large bank credit supply during our sample period. Furthermore, we are able to control for firm and time fixed effects and firm characteristics such as firm age, industry, and number of employees. We are also able to control for rich characteristics of the entrepreneur, including age, education level, credit score, and credit history. In the second stage,

we use the instrumented business credit origination volume to estimate the elasticity between business credit originations and the personal credit originations $PersCredit_{ict}$ of the owners of firm *i*. The resulting parameter δ is a measure of the degree to which small businesses are able to use the personal credit of entrepreneurs as a substitute for business credit when banks cut small business lending. To help identify the time fixed effects and coefficients on covariates, we include consumers who are not small business owners as a control sample in the second stage. This control sample is matched on a rich set of observables from the consumer credit panel to account for the fact that the top-4 bank share may simultaneously affect personal and business credit availability in a county.

The left graph of Figure 1 shows our first stage results, which replicate the findings of CHS that top-4 banks reduced small business credit on the intensive margin. The right graph shows reduced form results on the consumer credit cards of entrepreneurs, showing that the contraction in small business credit was accompanied by a nearly one-to-one increase in personal credit by entrepreneurs. Because the coverage of business credit lines is less complete than consumer credit lines, our first-stage may be under-estimated, suggesting that the one-for-one substitution to personal credit is an upper bound.

As natural next steps, we will examine whether all business owners are able to tap into their personal credit on behalf of their businesses, or whether this remedy is only available to those with the highest credit scores and/or highest collateral values.. We will also examine the extent to which exposure to business and consumer fintech lending can help remedy the total reduction in credit supply, and the ultimate effects of credit contractions on the growth and survival of the small businesses.

While our dataset does not include the identities of the banks making each loan, we have indicators for trades originated by top-4 banks. Thus, we can replicate this analysis by replacing $T4DS_c$ with a proxy for whether a firm has a tradeline with a top-4 bank and verify whether businesses that are directly borrowing from the largest banks are hardest hit by the contraction in lending, and the degree to which these businesses are able to draw upon the personal credit of entrepreneurs instead

The dataset we are using is proprietary to the credit bureau, and we are unable to release the microdata due to confidentiality agreements with the vendor. However, we are happy to work with the data vendor, the NBER and/or the publishing journal to secure permission for the release of code, summary tables, and collapsed data files for replication purposes to the extent possible.

Budget

Given the size and complexity of the dataset, we expect to incur considerable costs to store and process the data to undertake the proposed analysis. Accordingly, the majority of the funds we are requesting from NBER would be allocated towards data storage and cloud computing services.

Data analytics services $1000 per month X 12 months	$12,000
Computing software and equipment	$1,000
Travel for researchers Travel to attend the NBER Household Finance meeting $1,000 per researcher X 2	$2,000
Total	$15,000

Bibliography

Adelino, Manuel, Antoinette Schoar, Felipe Severino. 2015. House Prices, Collateral, and Self-Employment. Journal of Financial Economics, 117 (2): 288-306.

Bertrand, Marianne, Antoinette Schoar, and David Thesmar. 2007. Banking Deregulation and Industry Structure: Evidence from the French Banking Reforms of 1985. The Journal of Finance, 62: 597-628.

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Corradin, Stefano, and Alexander Popov. 2015. House Prices, Home Equity Borrowing, and Entrepreneurship. The Review of Financial Studies, 28 (8): 2399–2428.

Kerr, Sari, William R. Kerr, and Ramana Nanda. 2019. House Prices, Home Equity and Entrepreneurship: Evidence from U.S. Census Micro Data. NBER Working Paper No. 21458.

Kerr, William R., and Ramana Nanda. 2009. Democratizing entry: Banking deregulations, financing constraints, and entrepreneurship. Journal of Financial Economics, 94 (1): 124-149.

Schmalz, Martin C., David A. Sraer, and David Thesmar. 2017. Housing Collateral and Entrepreneurship. The Journal of Finance, 72: 99-132.

Small Business Credit Survey. 2019. FED.

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APPOINTMENT

Assistant Professor of Finance *2019-*
University of Illinois at Urbana-Champaign

EDUCATION

Ph.D. in Economics 2019
Princeton University

M.A. in Economics 2015
Princeton University

M.A. in Economics 2013
Graduate School of Economics, Getulio Vargas Foundation (EPGE-FGV)

B.A. in Economics 2010
Federal University of Rio de Janeiro (UFRJ)

PUBLISHED OR ACCEPTED PAPERS

"Financial Development and Labor Markets: Evidence from Brazil", with Bernardus Van Doornik
Accepted, Journal of Financial Economics

We estimate the effect of an increase in the availability of bank credit on the employment and the wages of high- and low-skilled workers. To do so, we consider a bankruptcy reform that increased the legal protections of secured creditors, which led to an expansion of bank credit to Brazilian firms. We use detailed administrative data and an empirical strategy that exploits cross-sectional variation in the enforcement of the new legislation arising from differences in the congestion of civil courts. We find that the expansion in credit led to an increase in the skill intensity of firms and in within-firm returns to skill. To rationalize these findings, we design a model in which heterogeneous producers face constraints in their ability to borrow and have production functions featuring capital-skill complementarity. We use this framework to generate an industry-level measure of capital-skill complementarity, which we use to provide direct evidence that the effect of access to credit on skill utilization and the skill premium is driven by a relative complementarity between capital and labor.

"Benchmarking Machine-Learning Software and Hardware for Quantitative Economics,"with Victor Duarte, Diogo Duarte and Alexis Montecinos
Journal of Economic Dynamics and Control, 2020

We investigate the performance of machine learning software and hardware for quantitative economics. We show that the use of modern numerical frameworks can significantly reduce computational time in compute-intensive tasks. Using the Least Squares Monte Carlo option pricing algorithm as a benchmark, we show that specialized hardware and software speeds the calculations by up to two orders of magnitude when compared to programs written in popular high-level programming languages, such as Julia and Matlab.

WORKING PAPERS

"Credit Access and Financial Health: Evaluating the Impact of Debt Collection"

Despite the prevalence of debt collection and the intense regulatory activity surrounding this industry, evidence on the causal impact of these practices on consumers is scarce. This paper conducts an empirical analysis of the effect of debt collection on traditional and alternative consumer credit and on indicators of financial health. I use individual credit record data and a research design that compares outcomes of consumers in states that restrict collection practices with those of consumers in counties that share a border but are located in a different state. I find that restricting collection activities leads to lower credit balances and limits, higher balances past due, and lower credit scores. Moreover, I find that payday borrowing increases once access to traditional credit declines, providing new evidence on the substitutability between traditional and alternative sources of credit.

WORKS IN PROGRESS

"Consumption and Portfolio Choice with Many Assets and Realistic Dynamics," with Victor Duarte, Aaron Goodman, and Jonathan Parker

"The Real Effects of Banking the Poor: Evidence from Brazil," with Adrien Matray

"Labor Misallocation Between the Private and Public Sectors: Evidence from Public Pension Reform in Brazil," with Adrien Matray

PRESENTATIONS AND SEMINARS

2021

Wharton, Brazilian Econometric Society Seminar Series (scheduled), University of São Paulo (scheduled)

2020

American Finance Association

Canceled due to COVID-19: UNC Round Table for Junior Faculty, Maryland Junior Finance Conference

2019

Duke Fuqua School of Business, Columbia Business School, Kellogg School of Management, Stanford Graduate School of Business, UCLA Anderson School of Management, Southern Methodist University, Federal Reserve Bank of Dallas, Rice Jones Graduate School of Business, Harvard Business School, Imperial College London, London Business School, UT Austin McCombs School of Business, Booth School of Business, Johns Hopkins Carey Business School, Dartmouth Tuck School of Business, UIUC Gies College of Business, NYU Stern Conference on Household Finance, Northern Finance Association Annual Conference, WAPFIN at NYU Stern

TEACHING

Advanced Corporate Finance (Undergraduate)

FELLOWSHIPS, GRANTS, AND AWARDS

Macro Financial Modeling Fellowship, Becker Friedman Institute 2018

NBER Household Finance Working Group Grant 2017

Julis-Rabinowitz Center for Public Policy and Finance Travel Grant	2017
Charlotte Elizabeth Procter Fellowship, Princeton University	2017 - 2018
American Finance Association Doctoral Student Travel Grant	2017
American Economic Association CSWEP Fellowship	2016

PROFESSIONAL ACTIVITIES

Conference program committees: European Finance Association; Brazilian Econometric Society

Referee: Economic Journal; Journal of Finance; Journal of Financial Economics; Review of Financial Studies

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EXPERIENCE

University of Illinois at Urbana-Champaign (Maternity leave 2018-19)	Assistant Professor of Finance	2016 - Present
The Wharton School Business Economics and Public Policy	Visiting Assistant Professor	2014
Consumer Financial Protection Bureau (Maternity leave 2014-15)	Economist	2012- 2016
Olin Business School Washington University in St. Louis	Assistant Professor of Finance	2010- 2012

EDUCATION

Ph.D	Financial Economics	Massachusetts Institute of Technology	2010
B.S.	Mathematics	California Institute of Technology	2003

RESEARCH FIELDS

Household finance, Fintech, Entrepreneurship, Behavioral economics

PUBLICATIONS

"The Economic Consequences of Bankruptcy Reform," *Accepted*, American Economic Review. (with Tal Gross, Raymond Kluender, Feng Liu, and Matthew Notowidigdo)

"The Marginal Propensity to Consume Over the Business Cycle" American Economic Journal: Macroeconomics, 12(2), 2020. (with Tal Gross and Matthew Notowidigdo)

"Minimum Payments and Debt Paydown in Consumer Credit Cards" Journal of Financial Economics, b131(3), 2019. (with Ben Keys)

"Early Medicaid Expansion Reduced Payday Borrowing Among Low-Income Adults in California" Health Affairs, 36(10), October 2017. (with Tal Gross, Heidi Allen, and Ashley Swanson)

"Liquidity Constraints and Consumer Bankruptcy: Evidence from Tax Rebates" Review of Economics and Statistics, 96(3), 2014. (with Tal Gross and Matthew Notowidigdo)

"Superstar Extinction" Quarterly Journal of Economics, May 2010. (with Pierre Azoulay and Joshua Graff Zivin)

"Secrets of the Academy: The Drivers of University Endowment Success" Journal of Economic Perspectives 22, Summer 2008. (with Joshua Lerner and Antoinette Schoar)

WORKING PAPERS

"The Effects of Disclosure and Enforcement on Payday Lending in Texas" *Revise & resubmit,* Journal of Financial Economics. (with Kathleen Burke)

WORKING PAPERS (CONT.)

"Bankruptcy and the COVID-19 Crisis" (with Jeyul Yang, Ben Iverson, and Renhao Jiang)

"When Is It Hard to Make Ends Meet?" (with Brian Baugh)

"Liquidity Constraints and Budgeting Mistakes: Evidence from Social Security Recipients" (with Jesse Leary)

OTHER PUBLICATIONS

"CFPB Data Point: Payday Lending" 2014. (with Kathleen Burke, Jonathan Lanning, and Jesse Leary)

"Payday Loans and Deposit Advance Products: A White Paper of Initial Data Findings" 2013.

"Evolution of Digital Organisms at High Mutation Rates Leads to Survival of the Flattest" Nature, July 2001. (with Claus Wilke, Charles Ofria, Richard E. Lenski, and Christoph Adami)

TEACHING EXPERIENCE

University of Illinois at Urbana-Champaign	
FIN 435: Personal Wealth Management	2016-21
FIN 490 & 580: Fintech	2019-20
FIN 434/571: Retirement Policy	2016-18
The Wharton School:	2014
BEPP 305: Risk Management	
Olin Business School:	2010-2012
Finance 340: Capital Markets and Financial Management	

GRANTS, HONORS, AND AWARDS

"The Evolution of Credit Card Contracts: Risk-based or Bias-based?"	2020-2022
- UIUC Campus Research Board ($24,397)	
"The Effect of Government Pensions on Labor Supply, Savings, and Financial Well-Being" (with William Skimmyhorn)	2017–2018
- TIAA Institute & Pension Research Council ($97,000)	
- NBER Retirement Research Center	
"The Marginal Propensity to Consume Over the Business Cycle" (with Tal Gross & Matt Notowidigdo)	2017
- Outstanding paper award in financial institutions, MFA	
"The Effect of Government Cash Assistance on Household Financial Outcomes" (with Manasi Deshpande and Tal Gross)	2016-2018
- Washington Center for Equitable Growth ($100,000)	
- NBER Household Finance small grant ($17,600)	
- NBER Disability Research Center	
"Social Security Benefits and Household Budgeting"	2016-2017
- NBER Retirement Research Center	
MIT Sloan Fellowship	2004-2010
Doctoral Award in Business, State Farm Companies Foundation	2007
Axline Merit Scholarship (Caltech)	2000-2003
Upperclass Merit Award (Caltech)	2001-2002

PROFESSIONAL ACTIVITIES

Ad-hoc committee member: Bankruptcy and COVID-19 Working Group	2020-21
Editorial Board: Journal of Pension Economics and Finance	2016 – present

PROFESSIONAL ACTIVITIES (CONT.)

Member: American Economic Association; American Finance Association; Western Finance Association — 2010 - present

Conference program committees: Midwest Finance Association; SFS Cavalcade; Western Finance Association

Ad-hoc referee: American Economic Review (and :Insights); American Economic Journal: Applied Economics & Economic Policy; Journal of Banking and Finance; Journal of Credit Risk; Journal of the European Economic Association; Journal of Finance; Journal of Financial and Quantitative Analysis; Journal of Financial Economics; Journal of Public Economics; Management Science; Review of Economics and Statistics; Review of Finance; Review of Financial Studies; Journal of Economic Behavior & Organization

CONFERENCES AND INVITED PRESENTATIONS
*** SCHEDULED**
† DISCUSSIONS
‡ COAUTHOR PRESENTING

University of Texas at Austin; RCFS Winter Conference†; London School of Economics Systemic Risk Centre; MIT Sloan; Federal Reserve Bank of Boston; Midwest Finance Association*†‡**;** NBER Corporate Finance*‡**;** Ohio State PhD Conference on Real Estate and Housing*†; Financial Intermediation Research Society*† **;** PUC Chile* — 2021

Finance in the Cloud I; #EconTwitter Virtual Finance & Economics Conference; MoFIR Virtual Banking Seminar; Stigler Center; SFS Cavalcade; NBER Summer Institute: Household Finance; National University of Singapore; University of Wisconsin Madison; WAPFIN; FDIC Consumer Research Symposium†; Virtual Finance Seminar — 2020

AEA Annual Meeting; Boston College; SFS Cavalcade; Western Finance Association; NBER Summer Institute: Corporate Finance; Arizona State University; Labor and Finance Group Conference — 2019

SFS Cavalcade; NBER Summer Institute: Public Economics; WAPFIN — 2018

University of California Irvine; Midwest Finance Association; Chicago Financial Institutions Conference; SFS Cavalcade; Kellogg FinTech Academic Workshop / Household Financial Choices; SSA Retirement Research Meeting; IPA Research Gathering — 2017

University of Washington; Columbia; University of Illinois at Urbana-Champaign; University of Colorado; Carnegie Mellon; NBER Law and Economics; Federal Reserve Bank of Philadelphia; Wabash River Conference; Red Rock Finance Conference; RAND BeFi; London School of Economics; Institute for Fiscal Studies; Financial Conduct Authority; University of Warwick — 2016

University of Delaware; NBER Law and Economics; Federal Reserve Bank of Cleveland; FDIC Consumer Research Symposium; RAND BeFi Conference; Southern Economics Association Annual Conference; Federal Reserve Board — 2015

American Economic Association Annual Meeting; University of Pennsylvania; Federal Reserve Bank of New York; Boulder Conference on Consumer Financial Decision Making — 2014 2014

CONFERENCES AND INVITED PRESENTATIONS (CONT.)

Federal Reserve Bank of Philadelphia	2013
Federal Reserve Board of Governors; Consumer Financial Protection Bureau; University of New South Wales; Australian National University; National University of Singapore; Singapore Management University; American Law and Economics Association Annual Conference	2012
Federal Reserve Bank of St Louis; Hong Kong University of Science and Technology; SWUFE	2011
Federal Reserve Bank of New York; George Washington University; McGill University; Securities and Exchange Commission; University of Southern California; University of Toronto; University of British Columbia; Washington University St. Louis	2010
Brown School of Public Health; European Financial Management Association	2007