

Small Firm Financing: Sources, Frictions, and Policy Implications

Ramana Nanda

Gordon Phillips*

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Abstract

We review the literature on the sources of financing and associated financing frictions facing small firms. Using data from the US Survey of Business Owners and UK's SME Finance Monitor, we first show that about half of small firms do not report using any external finance either for startup or for expansion. Among those that do, bank and credit card-based borrowing by the business and its owners account for the overwhelming share of external finance. Second, we highlight that there is growing evidence of heterogeneity in financing frictions facing small firms: a substantial share of firms may not even seek external finance or benefit from relaxed constraints because they do not wish to grow; on the other hand, relaxing constraints has large measured effects on investment and employment for certain sub-populations of small firms. This heterogeneity has important implications for how average effects are interpreted in academic studies, as well as for how policy is enacted. We conclude by noting the greater availability of micro data on small firm financing in recent years. This has the potential to generate substantial insight on the degree to which the rise of financial technology can overcome traditional financing frictions, as well as enhance our understanding of the effectiveness of different types of government interventions on small business financing and growth.

Keywords: Small firms, external financing, bank debt, receivables, credit cards, venture capital, financial constraints.

JEL classification: D13; L25; L26; G21; G24; G31; G33; G32; G34; M13.

*Nanda: Imperial College London, ramana.nanda@imperial.ac.uk; Phillips: Tuck School of Business at Dartmouth and NBER, email: gordon.m.phillips@tuck.dartmouth.edu. We thank Tong Yu for research assistance and are grateful to Espen Eckbo and Morten Sorensen for their helpful comments.

1 Introduction

Small firms form the backbone of the economy. In the United States, they account for over 90% of all firms and over 40% of economic activity (SBA, 2019). Moreover, startups – the vast majority of which start small– have been shown to play a particularly important role in driving productivity growth and net job creation, making them an important and set of firms to understand for academics and policy makers alike.

Young and small firms also have particular features that make them more susceptible to financing constraints: they may depend more on external finance to support their growth, yet they often have less ‘hard’ data available on which to make funding decisions. This can often lead them to be perceived by financiers as more ‘opaque’ or subject to asymmetric information. In addition, small firms often have a single relationship with financial intermediaries such as banks, making them more subject to informational hold-up by financial intermediaries and hence face worse terms when raising external finance.

But how salient are these financial frictions and to what extent do they have a quantitatively important impact on real outcomes such as employment or productivity growth? In this review, we provide an overview of the large and growing literature on understanding financing constraints facing small businesses with a view to answering these questions.

We start in Section 2 by using representative data from the U.S. Survey of Business Owners (SBO) to describe the main sources of financing for US business owners, broken down by firm size. We also show using data from the SME Finance monitor that these patterns appear consistent with the financing patterns in the UK. These statistics provide an organizing framework for reviewing the literature on the sources of small firm financing and associated frictions, and also shed light on financing sources that appear under-studied relative to their use by small businesses. For example, credit card financing, both to the owners and the business, stands out as a key area that that received comparatively less attention relative to the intensity with which it appears to be used by small firms.

In Section 3, we discuss the aggregate effects of relaxing financing constraints. A key insight from this section is that there appears to be substantial heterogeneity in the findings of different

papers in terms of the magnitude of financing frictions facing small firms. These differences seem related to the sub-sample of entrepreneurs being studied, which highlights the important role of understanding the composition of small businesses when interpreting aggregate effects, both for academics and policy makers looking to enact reforms.

In Section 4, we discuss research on potential technological and policy interventions to reduce financing constraints for small firms. Several elements have contributed to making this an active area of work. First, there is growing availability of micro data on small firm-financing with the potential to tie this to longer term firm outcomes. This enables a much deeper understanding of the causes and consequences of financing constraints, as well as an understanding of heterogeneity among different sub-populations of small businesses. Second, there has been a massive rise of financial technology in recent years, both within traditional banks and with new ‘fintech’ startups, several of whom are looking to exploit inefficiencies in small business lending. Studying their impact enhances our understanding of what frictions such fintech might address and what remain. Third, there have been several government interventions aimed at helping small businesses, particularly in the wake of the COVID-19 pandemic, which again enables a deeper understanding of the nature of financing frictions and the policies that might be most effective at alleviating them.

Finally, in Section 5, we provide a brief discussion and conclusion, summarizing what the body of work on small firm financing frictions has taught us and outlining promising areas of further inquiry.

2 Sources of Small Firm Financing

We begin by documenting the sources of finance as reported in the Survey of Business Owners and Self-Employed Persons (SBO). We use data from the 2012 SBO, which is the most recent data available through the Census Bureau’s public use API as of the time of writing.¹ The SBO surveys a representative sample of non-employer (self-employed) and employer businesses in the U.S.

We focus on the sources of financing used by employer firms that form the bulk of economic

¹See <https://www.census.gov/data/developers/data-sets.html>

activity. Tables 1 and 2 break down the sources of financing by firm size and separately report the sources of capital used by business owners as part of their startup capital (Table 1) and expansion capital (Table 2). Table 3 provides a similar perspective on financing in the UK using data from the SME Finance Monitor. A number of patterns jump out from these tables: First, although most owners report using some capital to start their businesses, a very large share of business owners did not use *any* capital for expansion in the year prior to the survey. Second, among those using capital for startup or expansion, the most common source of capital appears to be ‘internal’ – personal savings or internal cash flow of the businesses. Only half the business owners report using any form of external finance. Third, consistent with Robb and Robinson (2014), debt is the dominant source of external finance for business owners, both in terms of startup and expansion capital.

We turn next to discussing each of the sources of financing noted in the Tables in more detail.

2.1 Personal Wealth

As seen in Tables 1 and 2, over 90% of business owners report using personal wealth as part of their startup capital and over a third of business owners report using personal wealth to finance business expansion. The large share of individuals using personal wealth to finance their businesses, combined with a minority of individuals reporting any form of external finance is often seen as a sign that small business owners face credit rationing or related financing constraints (Stiglitz and Weiss 1981). Moreover, early research on large cash windfalls from bequests measured strong entrepreneurial responses (Holtz-Eakin, Joulfaian, and Rosen 1994; Blanchflower and Oswald 1998), consistent with these bequests unlocking credit constraints.

While such an explanation is intuitive, recent work has also noted the potentially small *demand* for external finance by many small business owners as well as noting identification challenges with using bequests to study financing constraints. Hurst and Lusardi (2004) document that the relationship between household wealth and entry is relatively constant for the bottom 80 percentiles of the wealth distribution and begin rising sharply thereafter, with the relationship between wealth and entrepreneurial entry is strongest in the top 5 percentiles of the wealth distribution. They note that such an exponential relationship between wealth and entry is inconsistent with the presence

of credit constraints deterring entry, particularly since the vast majority of entry at the top of the wealth distribution is into industries such as finance, law and real estate that are not at all capital intensive. Instead, they argue that the lifestyle of an entrepreneur is a ‘luxury good’. Those at the top end of the wealth distribution are more likely to want to consume this luxury good. Hurst and Lusardi (2004) also show that bequests in the future are as likely to predict business starts as past bequests, suggesting that they are likely to measure a number of other factors associated with household wealth that are unrelated to alleviating financing constraints. Moreover, more recent evidence that has examined the impact of cash windfalls on the *who* selects into entrepreneurship suggests that rather than alleviating a financing constrain, they may enable those with lower human capital to start firms by relaxing the discipline of external finance (Andersen and Nielsen 2012; Bellon et al. 2021).

Further evidence of such an argument comes from Hamilton (2000) who shows that non-pecuniary motivations appear to play an important role in explaining the fact that small business owners enter and persist in self-employment even when their predicted earnings in wage employment could be higher. Moskowitz and Vissing-Jørgensen (2002) also suggest the role of non-pecuniary motivations in explaining what they note as a ‘private equity premium puzzle’ – the fact stakes that business owners hold in their (privately held) businesses does not earn the required premium one would expect it to earn given its large and un-diversified nature of overall household wealth. Hurst and Pugsley (2011) report direct evidence on the lack of demand for expansion capital among many small business owners. They show that a large share of small business owners do not express any intention or desire to grow larger or to innovate.

Of course, it is important to note that non-pecuniary motivations for becoming and remaining a small business owner are not inconsistent with the presence of financing constraints facing other small business owners who are looking to grow. However, this heterogeneity in the motivations and related capital needs of small business owners is an important issue and a theme that runs through this chapter: it has implications for how we measure the acuteness and the real effects of financing constraints facing entrepreneurs as well as an understanding of what the appropriate policy interventions are likely to be.

2.2 Bank finance

Tables 1-3 show that the majority of external finance used by firms involves debt and that moreover, debt financing from financial intermediaries such as banks is the predominant source of external financing for small firms. A long literature has examined the role of bank financing to small businesses, identifying a number of challenges faced in bank lending to small businesses and the ways in which small businesses and banks try to overcome these.

Perhaps the most salient feature of most small businesses from the perspective of a financier is their *opacity*. Their accounts are not subject to rigorous scrutiny in the same manner as larger and publicly traded firms. In addition, there is often a blurry line between household balance sheets and small business balance sheets. For this reason, small business depend almost exclusively on bank financing as a source of external debt as the informational advantage of banks allows them to more easily overcome challenges such moral hazard and adverse selection relative to arms-length financiers involved in bond financing (Diamond 1984; Diamond 1991).

Early empirical work in this area emphasized the importance of bank-borrower relationships as a way for banks to overcome information challenges, and highlighted how the length of relationships (Berger and Udell 1995; Berger, Klapper, and Udell 2001) and concentration of all banking relationships with one bank were tied to more favorable prices and terms faced by small businesses as was shown early by Petersen and Rajan (1994).

Although banking relationships clearly play an important role in facilitating access to finance for small businesses, subsequent research has also highlighted how bank structure plays an important role in impacting small businesses lending (Berger and Udell 2002; Berger et al. 2005). Specifically, this work has highlighted how observably similar small businesses appear to get more credit at better terms from smaller community banks when compared to large banks. There is no reason to believe that loan officers in larger banks have less ability to screen and monitor small businesses, but Stein (2002) shows theoretically that this is likely to be driven by the fact that ‘soft’ information is harder to transmit across hierarchies. In smaller banks, information does not have to pass through several layers of hierarchy, providing loan officers an incentive to collect and use ‘soft’ information for their lending decisions. This enables them to provide small businesses with more credit at better

terms.

However, banks with decentralized lending structures may not always be best for small business lending. This is because, as noted by Rajan (1992), the informational advantage of banks gives them the ability to extract rents from small businesses – which could be particularly true in markets where there is little banking competition. Consistent with this view, Sapienza (2002) and Erel (2011) find that mergers tend to improve efficiency, but as the local market share of the acquired banks increases, the efficiency effect is offset by market power. When banks become larger, they reduce the supply of loans and increase loan spreads for small borrowers. Similarly, Canales and Nanda (2012) find that decentralized banks give larger loans to small firms and those with soft information. However, decentralized banks are also more responsive to their own competitive environment. They are more likely to expand credit when faced with competition but also restrict credit and charge higher prices when they have market power.

A more recent literature on bank financing for small businesses has documented a substantial decline in Commercial and Industrial (C&I) lending to small businesses, particularly in the wake of 2007 financial crisis and the subsequent Great Recession (Bernanke 2010; Mills and McCarthy 2014). This decline seems particularly sharp in markets where the largest banks have more market share (Chen, Hanson, and Stein 2017), potentially driven by regulation. Whatever the reasons, the degree to which this is driven by changing demand for bank credit, shifts in the available supply of risk capital or a substitution away from banks to fintech intermediaries all warrant further investigation, as we discuss further in Sections 4 and 5.

2.3 Personal Credit

Tables 1 and 2 document the prominent role of home equity loans and lines of credit as a source of financing for business owners, particularly for startup capital. Home equity and credit cards are comparable in size with bank financing in terms of their frequency of use by smaller firms. Indeed, given the blurry line between household and firm balance sheets when it comes to small business financing, a number of papers have discussed the role of secured and unsecured *personal* credit in enabling the entry and growth of small firms.

2.3.1 Home Equity financing

When banks' screening technology cannot fully overcome the challenges associated with the opacity of small businesses, they can rely on pledgeable collateral to reduce their loss in the event of default. The ability to re-possess collateral in the event of default means that banks may be willing to lend in instances where they are confident about the resale value of the collateral, even if they are unable to assess the firm's ability to repay credit through cash flow from operations.

A number of papers have examined increases in available home equity of the entrepreneurs—either through mortgage reforms (Kerr, Kerr, and Nanda 2022; Lastrapes, Schmutte, and Watson 2021; Jensen, Leth-Petersen, and Nanda 2022) or house price increases (Black, Meza, and Jeffreys 1996; Adelino, Schoar, and Severino 2015; Corradin and Popov 2015; Schmalz, Sraer, and Thesmar 2017) and studied how this in turn might enable entrepreneurship. This work finds consistent evidence that increases in the value of housing collateral available to pledge by an entrepreneur increases the likelihood of selection into entrepreneurship, although as we discuss further in Section 3, the magnitude of the effect varies across studies. Interestingly, the role of home equity appears most valuable for relaxing the entry constraint for entrepreneurs. As seen in Table 2, far fewer entrepreneurs report using home equity to finance the expansion of their businesses.

2.3.2 Unsecured Personal Credit

The willingness of banks to make unsecured loans to small businesses is interesting in itself and likely tied to the massive growth in unsecured consumer credit over the last several decades. The latter has been driven by the increases in data and credit scoring methodology on individuals' ability to borrow and repay credit. Given the greater ability of financiers to gather individual characteristics and model consumer credit behavior compared to credit scoring small businesses themselves, many business owners end up either explicitly or implicitly relying on their personal creditworthiness when raising funding for their businesses. Robb and Robinson (2014) note for example that a large share of start-ups receive debt financing through the personal balance sheets of the entrepreneur.

The implicit role of personal assets in unsecured lending has been examined most frequently in

the context of personal bankruptcy laws, which vary considerably across states. A particular source of variation is the ease with which lenders can access personal assets of individuals in the event that they declare bankruptcy and have unpaid debts. Some states have high exemption limits and prevent lenders from possessing an individual's home, while others have low exemptions, meaning that banks have a higher likelihood of recovering some portion of their principal if a borrower with unsecured credit declares personal bankruptcy. Variation across states terms of the ability of banks to reposes personal assets is likely to have equilibrium effects – higher exemptions are likely to increase demand for unsecured credit, but lower the willingness of financiers to lend. Berkowitz and White (2004, Berger, Cerqueiro, and Penas (2011) document that the supply effect appears to dominate – in that small businesses were less likely to have credit in states with more lenient bankruptcy laws. Robb and Robinson (2014) also note that borrowers in states with higher personal bankruptcy exemptions have lower ratios of debt to personal capital.

One area that has received relatively little attention in literature is the role of credit card financing in supporting small businesses. Anecdotes often suggest that entrepreneurs ‘max out their credit cards.’

Fonseca and Wang (2021) use a dataset that links household and firm liabilities for 1% sample of US individuals with credit scores and document substitution to personal credit when business face constraints in bank financing following the 2007 crisis. Herkenhoff, Phillips, and Cohen-Cole (2021) provide direct evidence of personal credit worthiness and revolving credit on entrepreneurship. They link detailed TransUnion credit records to Census employee and firm data building a panel of over 3 million workers that they follow for close to ten years. They find that if an individual's unused revolving credit (credit cards and personal lines of credit) increases by 10% in the current year, their potential to start a new firm increases by 0.021 percentage points in the subsequent two years. This represents a 7% increase relative to the sample average rate of firm ownership, suggesting a large elasticity of new firm start-ups to borrowing capacity. They also find that self-employment rates also increase by 0.66 percentage points in the year following a 10% increase in an individual's unused revolving credit. Relative to the sample average self-employment rate of 10.6%, this represents a 6% increase. These elasticities show a large role for consumer credit as part of start-up financing.

2.4 Equity Financing

A consequence of taking an aggregate perspective on small firm financing is that external equity financing such as Venture Capital plays a small role as a share of firms raising external finance. This topic is also covered by other chapters in the Handbook, so we only touch upon a few topics. Da Rin, Hellmann, and Puri (2013) and Lerner and Nanda (2020) provide more extensive reviews of the literature.

2.4.1 Venture Capital

About 0.5% of firms in the SBO report using Venture Capital (VC), which is consistent with the other work on the proportion of VC-backed startups in the US (Puri and Zarutskie 2012). VC is not appropriate for many firms. From the perspective of entrepreneurs, VC only makes sense when entrepreneurs are willing to forgo substantial dilution in terms of their equity ownership as well cede control to VCs. Nevertheless, VC is a very important source of risk capital for the firms with the highest growth potential in the economy and for those involved in commercializing radical new technologies for whom VC remains one of the only viable sources of external finance.

As evidence of the disproportionate role played by VC-backed firms in the economy, Lerner and Nanda (2020) look at Initial Public Offerings (IPOs) over the 1995-2018 period and report that VC-backed startups account for just under half these IPOs, despite accounting for less than 1% of startups each year receiving a first round of VC financing. These publicly traded VC-backed firms were more likely to have survived as of December 2019, and among the surviving firms accounted for a disproportionate share of R&D expenditure and Enterprise Value – highlighting the importance of the firms backed by VC for aggregate innovation.

A long literature has aimed to document the value added role played by VC investors, and degree to which they play a causal role in impacting firm performance, versus simply selecting firms with the highest growth potential (Kortum and Lerner 2000; Samila and Sorenson 2011; Chemmanur, Krishnan, and Nandy 2011; Puri and Zarutskie 2012; Bernstein, Giroud, and Townsend 2016). Much less attention has been paid to frictions associated with receiving VC financing. Lerner and Nanda (2020) point to two such frictions that appear to warrant further inquiry. First, they point

to the the concentration of funding within networks that tend to be skewed heavily towards male entrepreneurs in a small number of large cities close to where VCs are located. They also point to the narrow band of innovation that VC is focused on financing.

2.4.2 Angel investors, Accelerators and Crowd Funding

There has also been a substantial rise in the the volume of Angel investment since the mid-2000s, in addition to the rise of new financial intermediaries such as Accelerators and Crowd Funding Platforms.

Ewens, Nanda, and Rhodes-Kropf (2018) trace this rise to the advent of cloud computing starting with Amazon’s Elastic Cloud Compute in 2006. They document how this technological shock enabled entrepreneurs to rent space on the cloud instead of making expensive fixed investments in IT-hardware, thereby lowering the cost of experimentation associated with their new product or service by over an order of magnitude. In turn, this lower cost of experimentation unleashed a wave of new entrepreneurs starting firms with much less capital. These shifts changed the investment landscape for early stage VC – creating a ‘Seed’ round of financing – that came before the ‘Series A’ round of venture capital funding.² It also creating the need for new types of intermediaries to address the evolving market for early stage venture finance.

One such intermediary are Accelerators, often referred to as ‘fixed-term, cohort-based “boot camps” for start-ups that offer educational and mentorship programs for founders, exposing them to a wide variety of mentors, including former entrepreneurs, venture capitalists (VCs), angel investors, and corporate executives’. Accelerator programs often culminate in a public pitch event, or “demo day”, during which the graduating cohort of start-up companies pitch their businesses to a large group of potential investors. (Hochberg 2015).

The rationale for the rise in such intermediaries is provided by Ewens, Nanda, and Rhodes-Kropf (2018), who note that the fall in the cost of the initial round of financing for startups substantially increases the real option value of the first financing, thereby enabling a greater number high option-value entrepreneurs to be financed – such as younger, less experienced founders with ‘moonshot’

²Venture Capital funding is made through a process staged investments, with the norm historically being that the first round was referred to as ‘Series A’, the second as ‘Series B’ and so on.

ideas. These entrepreneurs need more intensive support, yet the fact that they are higher option value also means they are more likely to fail which required early investors to find more scaleable forms of providing value added services. The cohort-based nature of Seed Accelerators help overcome this challenge. Additionally, the much larger number of potential investment opportunities made screening substantially more difficult for VCs. The Accelerators provided a way to curate a set of more viable investment opportunities that VCs can learn about during the “demo days”. Gonzalez-Uribe and Leatherbee (2018) study the value added role of such Accelerators, as well as trying to distinguish the impact of the mentoring and support from the validation associated with being admitted to the program.

Beyond Accelerators, there has also been a rise in the prominence of Angel investors – individuals investing their own savings into young, private companies (as opposed to institutional investors who deploy capital on behalf of others). In turn, the large rise in the number of investors and investment opportunities has led to intermediaries such as equity crowdfunding platforms.³ The lack of systematic, high quality data on angel investments makes analysis challenging. Recent research suggests that they may be less sophisticated (Yimfor 2021) and less sensitive to financial motives of investment (Denes et al. 2020) and may also be more likely to suffer adverse selection. A promising direction of equity crowdfunding appears to be in syndicates of angel investors pooling their funding and expertise, which may enable them to overcome some of the challenges associated with getting the adversely selected investments (Agrawal, Catalini, and Goldfarb 2016).

2.5 Trade Credit

Although the SBO does not ask business owners about the use of trade credit due to the fact that it is not typically considered as a source of financing from a financial intermediary, data from a comparable survey in the UK called the SME finance monitor, highlights how nearly over half of small businesses use trade credit. The use of trade credit is usually seen as an expensive source of borrowing and has therefore been seen as sign that firms may face constraints in financing their working capital with lines of credit from the bank.

³Rewards-based crowdfunding platform such as Kickstarter help drive certification and raise funding for prototypes through prepayment, but do not involve equity finance.

More recently, however, a growing literature has also begun to document the degree to which smaller firms in supply chains are effectively financing their customers through trade credit (Barrot 2016). By being paid weeks after the sale of a good or a service, firms effectively provide short-term corporate financing to their customers. Such inter-firm trade credit financing is, in aggregate, three times as large as bank loans and fifteen times as large as commercial paper in the US (Barrot and Nanda 2020).

Trade credit claims, recorded as accounts receivable on firms' balance sheets, are typically seen as short-term, liquid, low-risk claims that should be very easy to pledge, and that should not constrain firm growth. Yet over a third of these accounts receivables are believed to sit on the balance sheets of small firms. Media reports seem to suggest that large firms continue to increase their cash flows by extending the time that they pay their small business suppliers, and recent research as found that long payment terms forces financially constrained small firms to cut back investment (Murfin and Njoroge 2015). Understanding the aggregate effects of such delayed payment is an important area of research and discussed in more detail in Section 3.

3 Real Effects of (Relaxed) Financing Constraints

As we have shown in Section 2, an extensive literature has examined the sources of financing for small businesses, as well as identifying ways in which financiers try to overcome the particular challenges associated with financing young and small firms.

Nevertheless, frictions in the process of screening and monitoring small firms can still lead to credit rationing (Stiglitz and Weiss 1981). In addition, intermediaries with market power have been shown to restrict credit and charge higher prices, leading to a wedge between the cost of internal and external finance that can lead positive NPV opportunities to go unfunded.

What are the real effects of these frictions? Are they consequential enough to have aggregate effects? Moreover, who benefits most when such constraints are relaxed? Are the effects concentrated among a few firms or impact small firms more broadly? And is the marginal firm that benefits from relaxed constraints of higher quality/productivity than the average unconstrained firm, or just on the margin in terms of productivity? Understanding these questions is not only important

for macro-economic models that are often motivated by financing frictions for entrepreneurs, but also help shed light on the appropriate policy interventions to address financing frictions for small firms (Greenstone, Mas, and Nguyen 2020; Caglio, Darst, and Kalemli-Özcan 2021).

The key empirical challenge that any work needs to address when answering such questions is to isolate exogenous shocks to the supply of small firm credit in a manner that is orthogonal to investment opportunities and firms' demand for credit. Given this empirical challenge, the most credible sources of exogenous variation tend to come from reforms or related 'shocks' to the supply of credit to small businesses. We summarize work looking at the real effects of such natural experiments.

3.1 Shocks to the supply of bank credit

Given their importance as a source of financing to small firms, banks and shocks to their ability to lend in a manner that is exogenous to local investment opportunities are an important laboratory for understanding financing constraints for small firms.

3.1.1 U.S. branch-banking deregulation

The U.S. commercial banking sector experienced substantial shifts in their regulatory environment between the 1970s and 1990s, leading to massive shifts in the competitive environment of banks over this period as described in Berger, Kashyap, and Scalise (1995).

Two types of banking restrictions were relaxed over this period. The first related to restrictions on intrastate branching that prevented new bank entry and acquisitions. For example, banks were restricted from opening new branches within states, and multi-bank holding companies faced restrictions in their ability to convert branches of acquired subsidiary banks into branches of a single bank. The second related to the Douglas amendment to the Bank Holding Act of 1956, which prevented a bank holding company from acquiring banks in another state unless that state explicitly permitted such acquisitions by statute. No state allowed such acquisitions until the late 1970s. States then entered reciprocal regional or national arrangements which allowed their banks to be acquired by banks in any other state in the arrangement. Except for Hawaii, all states had

entered such agreements in 1993. These episodes of interstate deregulation culminated with the passage of the 1994 Riegle-Neal Interstate Banking and Branching Efficiency Act, which codified these state-level changes at the national level.

The primary impact of such branch bank deregulations was to enable banks to enter new markets, shifting the competitive environment for banks. Following the deregulations, the number of banks fell by a third between 1977 and 1994. Early work on the impact of the deregulations by Jayaratne and Strahan (1996) and Jayaratne and Strahan (1998) examined bank efficiency and bank entry and growth rates of per capital income and output. Their results suggested that more efficient banks emerged post-deregulation and most of the reduction in banks' costs were passed along to bank borrowers in the form of lower loan rates. Consistent with this, Sapienza (2002) and Erel (2011) find that credit supply and loan terms generally improve for small businesses where there is more competition.

Black and Strahan (2002) and Cetorelli and Strahan (2006) were the first papers to examine the real effects of deregulation on entrepreneurship. They measure large increases in entry following the inter-state banking deregulations, particularly among smaller entrants with under ten employees. Kerr and Nanda (2009), Krishnan, Nandy, and Puri (2015) and Bai, Carvalho, and Phillips (2018) use comprehensive firm- and establishment-level Census data to study heterogeneity in the types of firms that benefited most from the deregulations.

Consistent with Black and Strahan (2002) and Cetorelli and Strahan (2006), Kerr and Nanda (2009) show that the greatest increase in entry occurred among very small start-ups. However, they document that the vast majority of this entry comprised new firms that failed within three years of founding. Such churning entry is consistent with the increased access to credit and better loan terms due to the banking deregulations enabling 'marginal' entrants who are likely to be weaker. It also helps account for the fact that despite the wide-spread entry documented by Black and Strahan (2002), the aggregate effects in terms of overall firm growth were much more muted.

Nevertheless, Kerr and Nanda (2009) also document that the deregulation did promote larger entrants and a smaller number of entrants that survived more than three years. Consistent with the rise of 'stronger' entrants in addition to the more marginal churning entrants, Krishnan, Nandy,

and Puri (2015) examine the productivity of existing firms following the state banking deregulations and find increases in firm TFP, which is particularly stronger for firms that were more financially constrained prior to the deregulations.

Bai, Carvalho, and Phillips (2018) begin with similar Census administrative data as the Krishnan, Nandy, and Puri (2015) but also combine it with Quarterly Financial Reports data that has comprehensive financing sources for small firms. The Quarterly Financial Reports micro data from the Census allows them to distinguish between debt from commercial banks (bank debt) and debt from other sources (nonbank debt). They find that that bank deregulation is associated with an economically large increase in the relative growth, and especially labor share growth, of more productive young firms. Secondly, they show that these small firms make more extensive use of bank credit post-deregulation to grow their firms. Moreover, this relative growth increase is important for both labor and capital, and it is not present for older firms.

Importantly, Bai, Carvalho, and Phillips (2018) show that the individual small firm effects they document translate into economically important gains in aggregate industry productivity and that changes in the allocation of labor are important in driving these gains at the firm and industry level. Industry and firm gains are particularly important as they show that while productivity per unit of labor (akin to an IRR) may be relatively flat, if more productive firms expand then overall value (akin to NPV) can increase more.

Not all the margins of banking deregulation have shown to be positive. While most evidence shows increases in commercialization and size, innovation may be less positively impacted. Using patent level and innovator level data, Hombert and Matray (2017) analyzes the effects of intrastate banking deregulation on the number of innovative firms and the movement of inventors across innovative firms. They find support for the hypothesis that in the move towards more banking markets more competitive, more specialized banking relationships that require soft information were adversely affected. They document adverse effects on innovation and inventors moving from small innovative firms, thus find a labor market reallocation of inventors across firms and states. Their results are consistent with small firms without hard assets being hurt by increased competition in banking markets while small firms with fixed assets and hard information benefiting from bank

deregulation. Chava et al. (2012) also find mixed effects on innovation when looking at intra-state vs. inter-state deregulation, while Cornaggia et al. (2015) look at innovation in small and large firms following the inter-state deregulation to examine the overall impact on state-level innovation. Note that the shift to commercialization and growth by firms may be viewed as an optimal shift to exploitation from exploration as firms age.

3.1.2 Shocks to Bank Balance Sheets

While the banking deregulations provide one way to examine changes in firm access to capital that are unrelated to specific investment opportunities, a second approach used in the literature has exploited shocks to bank balance sheets as a way to study the resulting transmission to small business lending. The premise behind these papers is that if the shock to bank balance sheets is large enough, banks will face constraints, forcing them to cut back on lending to firms independent of the borrowing firms' investment opportunities.

Schnabl (2012) examines this in an emerging markets context, studying the impact of the 1998 Russian default on the local economy in Peru through the transmission of this external shock to local firm borrowing through these banks' exposure to the Russian crisis. He finds large cuts in lending in Peru by banks that were exposed to the 1998 Russian lending crisis and further documents that local banks do not fully pick up the slack and increase their lending enough to compensate for the lost lending relationships by the international banks.

Chodorow-Reich (2014) examines this in the U.S. context in the aftermath of the 2007 financial crisis by exploiting cross-sectional variation in commercial banks' exposure to Lehman Brothers' bankruptcy. He combines lending data from Dealscan on banking relationships for over 2,000 firms from the U.S. Census Longitudinal Business Database (LBD) which has establishment-level employment information for small firms. He examines small firms with less than 50 employees and medium sized firms with 50-1000 employees. He finds a large negative impact on employment for small and medium sized firms that had pre-crisis relationships with lenders that were impacted by the Lehman crisis. He documents a large effect - the withdrawal of credit by lenders accounted for up to one-half of employment declines at these impacted small and medium sized firms.

Huber (2018) studies a similar decline in small business lending in Germany by Commerzbank in the great financial recession of 2008-2010 and shows the effects extend beyond firms with direct banking relationships to include the broader local economy due to aggregate demand and agglomeration spillovers in the most affected counties. These spillover effects are interesting as they document that the real effects of financing frictions facing small firms may not be restricted to the firms themselves, but have broader macro-economic effects due to the general equilibrium effects.

3.2 Exogenous increases in access to personal credit

A different line of research has examined exogenous increases in access to personal credit, to study the response of entrepreneurship and thereby aim to identify financing frictions facing the founders.

A growing stream of work on the role of housing collateral on entrepreneurship has found a clear role for unlocked collateral enabling entrepreneurship, although the magnitude of the effect varies across studies. In part this is due to the fact that most studies exploit variations in house price increases to study changes in the value of housing collateral, but isolating the causal role of increased collateral on entrepreneurship from other other factors that are correlated with increased value of home equity is difficult without individual-level controls. For example, Kerr, Kerr, and Nanda (2022) find that during the housing market boom of the 2000s, wealthy individuals – who got the largest increases in home equity by virtue of their bigger homes – were also more responsive to entrepreneurial opportunities independent of relaxed constraints. As noted in Section 2, this is consistent with Hurst and Lusardi (2004) who find that wealthy individuals more likely to enter entrepreneurship, often in sectors such as real estate (e.g. as real estate agents), which of course is also a more attractive opportunity during housing booms.

Recent work looking at at the sources of small business financing also shows that while prevalent, home equity financing appears to be used by a small minority of businesses. Indeed as noted by Caglio, Darst, and Kalemli-Özcan (2021), the majority of bank lending to small firms appears to be based on ongoing business value rather than the value of tangible collateral. Consistent with this, research looking at mortgage reforms (Lastrapes, Schmutte, and Watson 2021; Jensen, Leth-

Petersen, and Nanda 2022; Kerr, Kerr, and Nanda 2022) documents interesting heterogeneity in the responses, where a small number of individuals have large responses to unlocked housing equity, which also has the potential to shed light on the characteristics of individuals facing financing constraints. Jensen, Leth-Petersen, and Nanda (2022), for example, show that in their context, the response is concentrated among those who were starting businesses in industries where they didn't have prior experience, making it harder for financiers to screen them.

Herkenhoff, Phillips, and Cohen-Cole (2021) exploit bankruptcy flags removal from consumer credit reports as a way to exploit an exogenous increase access to personal credit. These removals occur, by law, no more than ten years after bankruptcy and give rise to large increases in credit ratings while not reflecting large changes in an individual's creditworthiness. They compare bankrupt individuals over time, before and after flag removal. Consistent with prior studies such as Musto (2004) and Han and Li (2011), they show that access to credit increases among the subgroup of individuals who have their bankruptcy flags removed. Their analysis of bankruptcy flag removal is focused on the credit access effect: credit constraints loosen after flag removal, allowing individuals to potentially finance self-employment and entry into new business ownership.

Bos, Breza and Liberman (2018) focus on the way reported delinquencies, that is, skipped payments as opposed to debt discharge, in the Swedish pawn registry affect earnings and self-employment. Bos, Breza, and Liberman (2018) show that individuals whose past defaults are publicly available for longer are less likely to have a job, are more likely to be self-employed, and earn lower incomes. on average.

With respect to self-employment, Herkenhoff, Phillips, and Cohen-Cole (2021) find that bankruptcy flag removal has a limited effect on the overall stock of self-employed individuals, as some individuals leave self-employment for formal employment and other individuals enter self-employment. Those who transition into self-employment after a bankruptcy flag removal borrow \$15k more than those who transition into self-employment prior to flag removal. This finding represents a 12.4% increase in borrowing relative to the sample average. They earn approximately \$1,000 more Schedule C net income at any time horizon we observe (an increase of about 4% relative to the sample average).

They then use the new Integrated Longitudinal Business Database (ILBD) to measure transi-

tions from self-employment to hiring paid employees in the Longitudinal Business Database (LBD). Focusing on this conditional sample of self-employed individuals examines people who are closer to the active margin of having demand for credit and shows how extra credit affects the tendency to start a new firm that has employees. They find that after flag removal, individuals are more likely to own a business with employees, that is, start-up a new firm. Among these new firm startups, these owners borrow, on average, \$40,000 more after flag removal, a 33% gain relative to the sample average.

Chatterji and Seamans (2012) study the impact of state-level removal of credit card interest rate ceilings on transitions into self-employment, following the US Supreme Court’s 1978 Marquette decision. Prior to this decision, states were allowed to set their own caps on credit card interest rates, but the court ruled that nationally chartered banks could charge the highest allowable rate in their home state, regardless of the interest rate ceiling in the customer’s state of residence. This allowed banks to ‘export’ interest rates across state boundaries, subsequently leading many states to remove their credit card interest rate ceilings and significantly increasing credit card companies’ efforts to market their cards to individuals. They find that credit card deregulation increased the probability of entrepreneurial entry, and also document heterogeneity in terms of the response, with a particularly strong effect for black entrepreneurs in states with a history of racial discrimination. This finding is consistent with the hypothesis that blacks living in states with a history of discrimination would have been most likely to face credit rationing and hence show the largest response to relaxed constraints on personal credit.

Overall, the entrepreneurial response to relaxed personal credit constraints not only highlights the presence of financing frictions, but helps to isolate the sub-sample of individuals who had the largest response, and hence shed light on the characteristics of individuals facing financial frictions.

3.3 Accelerated Payment of Trade Credit

As noted in Section 2, trade credit is used by a substantial share of firms in supply chains. Although not based on borrowing from a financial intermediary, it is effectively a source of borrowing from (or lending to) other firms. Since small firms typically have only a few weeks worth of cash on

their balance sheets, long payment times can play an important role in preventing expansion and growth.

Barrot (2016) uses a natural experiment that changes trade credit payable terms in France to demonstrate the importance of financial constraints to the entry and survival of small firms. He examines the entry and exit of firms surrounding trade credit regulation reform that went into effect in 2006. This reform prevented firms from extending to their customers payment terms in excess of 30 days. This reform resulted in a significant 15% reduction in payment terms relative to their pre-reform level. He examines the entry and exit of firms following this working capital reform. The micro level data set that Barrot uses combines firm-level data with information on business creation and defaults for the universe of French firms, which enables him to carefully analyze how short-term corporate liquidity impacts the entry and survival of financially constrained entrepreneurs. He shows that probability that a trucking firm that receives the benefit of quicker payment causes a decrease in the probability of a bankruptcy filing decreases by 60 bps, a 25% drop with respect to the pre-restriction level. Furthermore, this effect is concentrated among small, young, cash poor, highly levered, and low payout firms, which are more likely to be liquidity constrained. His results provide consistent evidence that the previous long payment terms impose substantial liquidity risk on financially weaker firms, forcing them into financial distress to a greater extent than if they were paid earlier.

Using a reform that reduces payment time by the U.S. government, Barrot and Nanda (2020) show that small business contractors to the U.S. government grew faster after the reform. In addition to increased employment growth, firms that benefited from the accelerated payments also begin paying their own suppliers in a more timely manner. Paying suppliers faster led to improvements in their own payment-related credit score within recorded by Dunn and Bradstreet. Barrot and Nanda (2020) also provide an estimate of the cost of financial constraints for small firms. Based on the elasticity of the employment response, They estimate that the implied cost of external finance for treated firms is approximately 40%, which while high, is comparable to the cost of trade credit and of other sources of financing available to small businesses in the wake of the financial crisis.

In looking at the aggregate impact of the accelerated payments, Barrot and Nanda (2020) find that aggregate employment increases, but only in areas where unemployment is high. In tighter labor markets, the positive employment effects of accelerated payments crowd out growth for firms competing in the same labor market, making the overall effect close to zero. This general equilibrium impact of reducing financing frictions is interesting as it highlights the conditions under which reduced credit frictions has a positive aggregate impact vs. simply leading some firms to grow at the expense of others.

3.4 Small Business Fragility during the COVID-19 Pandemic

There are multiple papers that have examined how small firms are impacted through their loss of business and credit during the recent COVID-19 pandemic. We discuss several of these papers here but do not provide a comprehensive survey. The key findings reinforce the conclusion that small businesses are financially fragile and are at risk of failure frequently during downturns and crisis. Also what this recent works shows is that data can be gathered from multiple sources including surveys that are done formally and via online media like Facebook.

Bartik et al. (2020) through an extensive survey shows the impact of the COVID-19 pandemic on small businesses. In addition to its impact on public health, COVID-19 has had a major impact on the economy. They survey more than 5,800 small businesses. Several main themes emerge from the results. First, extensive mass layoffs and closures have occurred. They find that 43 percent of businesses are temporarily closed, and businesses have – on average – reduced their employee counts by 40 percent relative to the month before the pandemic. Second, consistent with previous literature, they document that small businesses are financially fragile. For example, the median business has more than \$10,000 in monthly expenses and less than one month of cash on hand. Third, the majority of businesses planned to seek funding through the CARES act. However, many small business had problems with accessing the aid, such as bureaucratic hassles and difficulties establishing eligibility.

Fairlie (2020) uses data from the current population survey for April 2020 and documents that the number of active business owners in the United States plummeted by 3.3 million or 22

percent over the crucial two-month window from February to April 2020. The drop in business owners was the largest on record, and losses were felt across nearly all industries and even for incorporated businesses. African-American businesses were hit especially hard experiencing a 41 percent drop. Latinx business owners fell by 32 percent, and Asian business owners dropped by 26 percent. Simulations indicate that industry compositions partly placed these groups at a higher risk of losses. Immigrant business owners experienced substantial losses of 36 percent. Female-owned businesses were also disproportionately hit by 25 percent. These findings of early-stage losses to small businesses have important policy implications and may portend longer-term ramifications for job losses and economic inequality.

Alekseev et al. (2020) survey approximately 1.9 million Facebook users, and 66,297 eligible individuals completed at least part of the survey: 46,669 business owners and managers, 4,163 operators of personal enterprises, and 15,435 business employees. They document that firms had seen losses, on average, of over one half of their business. Not surprisingly small business finances suffered during the pandemic. Many businesses were struggling to pay bills (31.3%), rent (24.9%), wages (24.1%), and debt obligations (23.0%). About 42% of businesses reported having more outflows than inflows in the past month, and 78.2% of businesses were concerned about cash flows over the next 3 months. Importantly, their survey considers sources of financing. They report that only a quarter of the businesses had access to formal sources of financing through a loan or line of credit from a financial institution, and most businesses were reliant on personal savings and informal sources of financing. Finally, they show that these small businesses had deteriorating financial conditions due to the COVID-19 crisis, through lack of access to capital or negative cash flows.

Chodorow-Reich et al. (2021) examine how small and large firms were differentially impacted by their lenders liquidity provision during the recent COVID recession. First, they document that small firms face more onerous terms than do large firms in their credit access to credit lines. Relative to large firms, small firms (i) obtain credit lines more frequently demandable or with much shorter maturity, (ii) post more collateral, (iii) have higher utilization rates, and (iv) pay higher spreads even conditional on other firm characteristics. Second, they examine small firms' borrowing after

many small firms obtained Paycheck Protections Program (PPP) loans. Given the more onerous terms they face on their credit lines, small and medium sized firms did not draw down credit from their banks while larger firms did. Small firms that were able to get PPP loans actually reduced their non-PPP borrowing from banks, while large firms drew down their credit lines.

Autor et al. (2020) indicate that the PPP boosted employment at eligible firms. Following the passage of the CARES Act, employment at eligible firms begins rising relative to employment at ineligible firms. They show that through the first week of June of 2020, the program boosted employment at eligible firms by a median of 3.25 percent. The upper range of this effect, once scaled by the overall estimated take-up rate in the economy, is 7.5 percent, which is below a rough upper bound on the likely treatment effect on employment calculated using a subset of about 1,500 firms that they identify as having received a loan from the SBA loan-level data. If their results generalize to the full sample of eligible PPP firms, this implies that the PPP increased aggregate U.S. payroll employment by about 2.3 million workers through the first week of June 2020. Balyuk, Prabhala, and Puri (2021) find that bank relationships matter in small business access to PPP funding. Small firms were more likely to get early access to PPP loans if they had prior bank relationships, especially with small banks

Howell et al. (2021) explores the sources of racial disparities in small business lending. They study the \$806 billion Paycheck Protection Program (PPP), which was designed to support small business jobs during the COVID-19 pandemic. PPP loans were administered by private lenders but federally guaranteed, largely eliminating unobservable credit risk as a factor in explaining differential lending by race. Even after controlling for a firm's zip code, industry, loan size, PPP approval date, and other characteristics, they find that Black-owned businesses were 12.1 percentage points (70% of the mean) more likely to obtain their PPP loan from a fintech lender than a traditional bank. Among conventional lenders, smaller banks were much less likely to lend to Black-owned firms, while the Top-4 banks exhibited little to no disparity after including controls. They find that that Black-owned businesses' higher rate of borrowing from fintechs compared to smaller banks is particularly large in places with high anti-Black racial animus, pointing to a potential role for discrimination in explaining some of the racial disparities in small business lending. Consistent

with this view, they find that when small banks automate their lending processes, and reduce human involvement in the loan origination process, their rate of PPP lending to Black-owned businesses increases.

4 The Role of Government Policy

Having shown the sources of financing and nature real effects of relaxed financing constraints, we turn in this section to discuss potential technological and policy interventions to reduce financing constraints for small firms. We first note that a key insight emerging from the work outlined in Section 3 is that estimated aggregate effects of (relaxed) constraints can vary considerably and that this variation appears to be driven by the underlying heterogeneity in the number and types of firms that benefit the most. This clearly has important policy implications – in particular, the policy response under a view that real effects are small effects for all firms is likely to be quite different compared to a view where there are large effect for smaller sub-samples of firms, particularly if it is possible to target such frictions effectively.

4.1 Information about credit worthiness

Beyond understanding heterogeneity, there has also been a massive rise of financial technology in recent years, both within traditional banks and with new ‘fintech’ startups, several of whom are looking to exploit inefficiencies in small business lending (Mills 2019). Studying their impact enhances our understanding of what frictions such fintech might address and what remain.

As noted in the prior sections, small business rely on banks as a primary source of external finance. The informational advantage of banks comes from their being informed rather than arms-length lenders. Moreover relationship lending and decentralized bank structures contribute to the ability of loan officers to collect and utilize ‘soft information’ to make lending decisions, which has been shown to have substantial predictive power beyond hard information such as credit scores (Iyer et al. 2016). Yet, as noted by Rajan (1992), the informational advantage of banks also gives them market power, that they can use to extract rents from the small businesses. This trade-off,

between the ability to collect information and to use it strategically against the small business remains a key tradeoff for small businesses. As noted in Section 3, bank competition can play a role in reducing the rent-extraction by banks, but other work has shown this can also come at the expense of relationship lending, which may also reduce the ability to lend in settings where soft information is key.

We discuss two different developments that have the potential to relax this tradeoff in a manner different from bank competition. The first entails the role of technology, and the increasing sophistication of machine learning algorithms that can extract great information value from textual and other meta data, and thereby ‘harden’ what has historically been ‘soft information’. Berg, Fuster, and Puri (2022) discuss the development of such fintech and note that at present, the advantage of fintech appears to be primarily in terms of the speed with which decisions can be made.

The second entails shifting the control rights associated with the use of the borrower’s information to the small business rather than leaving them solely with the incumbent bank - as is the case with regulations related to ‘Open Banking’ (Babina, Buchak, and Gornall 2022). Shifting the control rights over transaction data (such as, for example, data on receipts and payments coming out of a business’ checking account) enable banks with which the small business does not have a relationship to learn about their creditworthiness. There is likely considerable complementarity between technological advantages and regulations such as open banking, as the value of being able to share one’s data is greater when competitors are able to study it more effectively.

Overall, however, understanding how such algorithms evolve, and the heterogeneous impact they may have on borrowers is both an important area of research and one that is worth understanding from a regulatory standpoint. For example, Fuster et al. (2022) show how greater flexibility to uncover structural relationships, can lead to disparities in rates received by borrowers. Using data on US mortgages, they find that Black and Hispanic borrowers are disproportionately less likely to gain from the introduction of machine learning algorithms.

4.2 Government as Customer

Beyond regulating the way in which information can be used, government can play a role in impacting financing constraints for small businesses through its role as a customer. In the U.S., government procurement amounts to 4% of GDP and includes \$100 billion in goods and services purchased directly from small firms. As shown by Barrot and Nanda (2020), accelerating payment to small businesses can directly impact cash flows and support firm growth. Chatterji, Chay, and Fairlie (2014) also provide evidence of how the practice of reserving a proportion of government contracts for minority-owned businesses that was introduced by cities in the 1980s helped reduce the self-employment gap for African American men.

The limitation of this channel is that it can only impact those selling to the government. This can have distributional consequences as well as impact overall efficiency depending on degree to which those selling to the government are either more, or less productive than the typical firm in that industry or region.

4.3 Loan Guarantees and Direct Interventions

In terms of understanding the trade-offs associated with different policy interventions, there have been several government interventions aimed at directly helping small businesses, such as in the wake of the COVID-19 pandemic. Some of these have been undertaken as direct subsidies while others have indirectly subsidised small businesses by working with financial intermediaries. This enables a deeper understanding of the nature of financing frictions and the policies that might be most effective at alleviating them.

The most common approach in which government is typically involved in alleviating financing constraints is through supply side interventions, either by directly financing startups believed to be facing credit constraints as in the case of Small Business Innovation Research (SBIR) programs (Lerner 2000; Howell 2017) or through loan guarantee programs such as the Small Business Administration's 7(a) and 504 programs (Brown and Earle 2017).

In understanding the potential benefits of direct lending vs. loan guarantees, an intuitive benefit of the latter is that it relies on an existing infrastructure of financial intermediaries who

have information about borrowers and are specialized in screening applicants. Nevertheless, the literature has identified several potential downsides associated with loan guarantee programs. First, Lelarge, Sraer, and Thesmar (2010) study the impact of guaranteed loan programs in France and find evidence of risk shifting by banks. Firms receiving guaranteed loans had higher assets, hired more and grew faster. But these firms also had a higher probability of subsequent default suggesting that riskier firms received the guarantees.

Second, a number of papers have studied loan guarantees in the context of PPP loans in the wake of the Covid pandemic. The PPP program was structured as a type of guaranteed loan program where firms applied to a participating private lender; once the loan was approved by the Small Business Administration (SBA), the lender would distribute funds to the firm. Loans were forgivable if the firm met certain criteria, including maintaining employment and wages at roughly pre-pandemic levels. A concern highlighted by this research is the fact that in setting where access to such loans is through financial intermediaries, the relationships of specific firms and their ability to have banks access the loans on their behalf was quite unequal, leading to heterogeneous ability to access the funds in a manner not always tied to the actual needs of the businesses.

Autor et al. (2022) examine the effectiveness of indirect approaches such as PPP and show that the \$800 billion dollars preserved 2-3 million job-years of employment at a cost of \$170,000 to \$275,000 per job. They conclude that only 23-34% of the funds went directly to workers who would have otherwise lost their jobs. Thus most of the money flowed to business owners and shareholders with about three-quarters of the funds flowing to the upper quintile of households.

Going forward, the growing availability of micro data together with such types of policy interventions have the potential to significantly deepen our understanding of the most effective ways to make supply side interventions and the tradeoffs associated with choosing these approaches in emergencies such as the Covid pandemic vs. more normal times.

5 Conclusions

In this chapter, we have examined the sources of small firm financing, evidence of the magnitude of financing frictions and the real effects when they are alleviated, as well as some of the ways in which policy makers continue to help alleviate small firm credit constraints.

Several themes have emerged from this work. First, we document important heterogeneity in the underlying population of small business owners. Much of the entry into business ownership at the top end of the wealth distribution is not in capital intensive industries and appears to be driven by non-pecuniary motivations. Nevertheless, a significant number of small firms that do appear to rely on external finance – both bank finance for their business as well as personal credit of their owners – do appear to face credit constraints, particularly in instances where it seems hard to evaluate their credit worthiness. Understanding whether it is possible to identify firms that are most likely to face such constraints based on ex-ante characteristics is important for an understanding of the actual magnitude of frictions facing these businesses, and more targeted approaches to alleviating these constraints.

In many ways a core challenge in alleviating small firm financing frictions relates to the enduring tradeoff between the special ability of banks to utilize soft information and resulting advantage they gain from being able to use this at the expense of the small firms themselves. Regulations that give businesses control rights over their own information, combined with increasing technological advances in machine learning have the potential to learn credit worthiness from attributes that were harder to learn from before. However, as we discussed, such algorithmic approaches appear to have their own downsides in terms of the unequal benefits that accrue to borrowers from such technological advances. Finally although governments across the world provide subsidies as a way to alleviate constraints, there is still a lot to be learned about the relative merits of direct lending vs. loan guarantees and the instances in which one approach might be preferable to the other. These remain some of the many promising avenues of further effort in understanding small firm financing constraints.

References

- Adelino, M., A. Schoar, and F. Severino. 2015. “House prices, collateral, and self-employment.” *Journal of Financial Economics* 117 (2): 288–306.
- Agrawal, A., C. Catalini, and A. Goldfarb. 2016. “Are Syndicates the Killer App of Equity Crowdfunding?” *California Management Review* 58 (2): 111–124.
- Alekseev, G., S. Amer, M. Gopal, T. Kuchler, J. W. Schneider, J. Stroebel, and N. C. Wernerfelt. 2020. “The Effects of COVID-19 on US small businesses: Evidence from owners, managers, and employees.” Technical Report, National Bureau of Economic Research.
- Andersen, S., and K. M. Nielsen. 2012. “Ability or finances as constraints on entrepreneurship? evidence from survival rates in a natural experiment.” *Review of Financial Studies* 25 (12): 3684–3710.
- Autor, D., D. Cho, L. D. Crane, M. Goldar, B. Lutz, J. Montes, W. B. Peterman, D. Ratner, D. Villar, and A. Yildirmaz. 2020. “An evaluation of the paycheck protection program using administrative payroll microdata.” *Unpublished manuscript*, vol. 22.
- Autor, D., D. Cho, L. D. Crane, M. Goldar, B. Lutz, J. K. Montes, W. B. Peterman, D. D. Ratner, D. V. Vallas, and A. Yildirmaz. 2022. “The \$800 Billion Paycheck Protection Program: Where Did the Money Go and Why Did it Go There?” Technical Report, National Bureau of Economic Research.
- Babina, T., G. Buchak, and W. Gornall. 2022. “Customer Data Access and Fintech Entry: Early Evidence from Open Banking.” *SSRN Working Paper 4071214*.
- Bai, J., D. Carvalho, and G. M. Phillips. 2018. “The impact of bank credit on labor reallocation and aggregate industry productivity.” *The Journal of Finance* 73 (6): 2787–2836.
- Balyuk, T., N. Prabhala, and M. Puri. 2021. “Small bank financing and funding hesitancy in a crisis: Evidence from the Paycheck Protection Program.” *Available at SSRN 3717259*.
- Barrot, J.-N. 2016. “Trade credit and industry dynamics: Evidence from trucking firms.” *The Journal of Finance* 71 (5): 1975–2016.

- Barrot, J.-N., and R. Nanda. 2020. “The employment effects of faster payment: evidence from the federal quickpay reform.” *The Journal of Finance* 75 (6): 3139–3173.
- Bartik, A. W., M. Bertrand, Z. B. Cullen, E. L. Glaeser, M. Luca, and C. T. Stanton. 2020. “How are small businesses adjusting to COVID-19? Early evidence from a survey.” Technical Report, National Bureau of Economic Research.
- Bellon, A., J. A. Cookson, E. P. Gilje, R. Z. Heimer, and S. Van Nieuwerburgh. 2021. “Personal Wealth, Self-Employment, and Business Ownership.” *Review of Financial Studies* 34 (8): 3935–3975.
- Berg, T., A. Fuster, and M. Puri. 2022. “FinTech Lending (preprint).” *Annual Review of Financial Economics*.
- Berger, A., L. Klapper, and G. Udell. 2001. “The ability of banks to lend to informationally opaque small businesses.” *Journal of Banking Finance* 25 (12): 2127–2167.
- Berger, A., and G. Udell. 1995. “Relationship Lending and Lines of Credit in Small Firm Finance.” *The Journal of Business* 68 (3): 351–81.
- . 2002. “Small Business Credit Availability and Relationship Lending: The Importance of Bank Organisational Structure.” *Economic Journal* 112 (477): F32–F53.
- Berger, A. N., G. Cerqueiro, and M. Penas. 2011. “Does debtor protection really protect debtors? Evidence from the small business credit market.” *Journal of Banking Finance* 35 (7): 1843–1857.
- Berger, A. N., A. K. Kashyap, and J. Scalise. 1995. “The transformation of the US banking industry: What a long, strange trip it’s been.” *Brookings papers on economic activity* 1995 (2): 55–218.
- Berger, A. N., N. H. Miller, M. A. Petersen, R. G. Rajan, and J. C. Stein. 2005. “Does function follow organizational form? Evidence from the lending practices of large and small banks.” *Journal of Financial economics* 76 (2): 237–269.
- Berkowitz, J., and M. J. White. 2004. “Bankruptcy and Small Firms’ Access to Credit.” *RAND Journal of Economics* 35 (1): 69–84.

- Bernanke, B. S. 2010. “Restoring the Flow of Credit to Small Businesses.” *Federal Reserve Meeting Series: “Addressing the Financing Needs of Small Businesses”* July 12 (<http://www.federalreserve.gov/newsevents/speech/bernanke20100712a.htm>): 2010 (July 12).
- Bernstein, S., X. Giroud, and R. R. Townsend. 2016. “The Impact of Venture Capital Monitoring.” *The Journal of Finance* 71 (4): 1591–1622.
- Black, J., D. d. Meza, and D. Jeffreys. 1996. “House prices, the supply of collateral and the enterprise economy.” *Economic Journal* 106 (434): 60–75.
- Black, S. E., and P. E. Strahan. 2002. “Entrepreneurship and bank credit availability.” *Journal of Finance* 57 (6): 2807–2833.
- Blanchflower, D. G., and A. J. Oswald. 1998. “What Makes an Entrepreneur?” *Journal of Labor Economics* 16 (1): 26–60.
- Bos, M., E. Breza, and A. Liberman. 2018. “The labor market effects of credit market information.” *The Review of Financial Studies* 31 (6): 2005–2037.
- Brown, J. D., and J. S. Earle. 2017. “Finance and growth at the firm level: evidence from SBA loans.” *The Journal of Finance* 72 (3): 1039–1080.
- Caglio, C. R., R. M. Darst, and S. Kalemli-Özcan. 2021, April. “Risk-Taking and Monetary Policy Transmission: Evidence from Loans to SMEs and Large Firms.” Working paper 28685, National Bureau of Economic Research.
- Canales, R., and R. Nanda. 2012. “A darker side to decentralized banks: Market power and credit rationing in SME lending.” *Journal of Financial Economics* 105 (2): 353–366.
- Cetorelli, N., and P. E. Strahan. 2006. “Finance as a barrier to entry: Bank competition and industry structure in local US markets.” *Journal of Finance* 61 (1): 437–461.
- Chatterji, A. K., K. Y. Chay, and R. W. Fairlie. 2014. “The Impact of City Contracting Set-Asides on Black Self-Employment and Employment.” *Journal of Labor Economics* 32 (3): 507–561.
- Chatterji, A. K., and R. C. Seamans. 2012. “Entrepreneurial finance, credit cards, and race.” *Journal of Financial Economics* 106 (1): 182–195.
- Chava, S., A. Oettl, A. Subramanian, and K. Subramanian. 2012. “Banking Deregulation and Innovation.” *Journal of Financial Economics*, vol. 109 (11).

- Chemmanur, T., K. Krishnan, and D. Nandy. 2011. "How Does Venture Capital Financing Improve Efficiency in Private Firms? A Look Beneath the Surface." *Review of Financial Studies* 24 (12): 4037–4090.
- Chen, B. S., S. G. Hanson, and J. C. Stein. 2017. "The decline of big-bank lending to small business: Dynamic impacts on local credit and labor markets." Technical Report, National Bureau of Economic Research.
- Chodorow-Reich, G. 2014. "The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis." *The Quarterly Journal of Economics* 129 (1): 1–59.
- Chodorow-Reich, G., O. Darmouni, S. Luck, and M. Plosser. 2021. "Bank liquidity provision across the firm size distribution." *Journal of Financial Economics*.
- Cornaggia, J., Y. Mao, X. Tian, and B. Wolfe. 2015. "Does banking competition affect innovation?" *Journal of Financial Economics* 115 (1): 189–209.
- Corradin, S., and A. Popov. 2015. "House prices, home equity borrowing, and entrepreneurship." *The Review of Financial Studies* 28 (8): 2399–2428.
- Da Rin, M., T. Hellmann, and M. Puri. 2013. "A Survey of Venture Capital Research." Chapter Chapter 8 of , Volume 2, 573–648. Elsevier.
- Denes, M. R., S. T. Howell, F. Mezzanotti, X. Wang, and T. Xu. 2020. "Investor Tax Credits and Entrepreneurship: Evidence from U.S. States." Nber working papers 27751, National Bureau of Economic Research, Inc.
- Diamond, D. 1991. "Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt." *Journal of Political Economy* 99 (4): 689–721.
- Diamond, D. W. 1984. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies* 51 (3): 393–414.
- Erel, I. 2011. "The Effect of Bank Mergers on Loan Prices: Evidence from the United States." *The Review of Financial Studies* 24 (4): 1068–1101.
- Ewens, M., R. Nanda, and M. Rhodes-Kropf. 2018. "Cost of Experimentation and the Evolution of Venture Capital." *Journal of Financial Economics*, vol. 128 (03).

- Fairlie, R. W. 2020. “The impact of Covid-19 on small business owners: Evidence of early-stage losses from the April 2020 current population survey.” Technical Report, National Bureau of Economic Research.
- Fonseca, J., and J. Wang. 2021. “How Much Do Small Businesses Rely on Personal Credit?” *Working Paper*.
- Fuster, A., P. Goldsmith-Pinkham, T. Ramadorai, and A. Walther. 2022. “Predictably Unequal? The Effects of Machine Learning on Credit Markets.” *Journal of Finance* 77 (1): 5–47 (February).
- Gonzalez-Uribe, J., and M. Leatherbee. 2018. “The Effects of Business Accelerators on Venture Performance: Evidence from Start-Up Chile.” *Review of Financial Studies* 31 (4): 1566–1603.
- Greenstone, M., A. Mas, and H.-L. Nguyen. 2020. “Do Credit Market Shocks Affect the Real Economy? Quasi-experimental Evidence from the Great Recession and ”Normal” Economic Times.” *American Economic Journal: Economic Policy* 12 (1): 200–225.
- Hamilton, B. H. 2000. “Does entrepreneurship pay? An empirical analysis of the returns to self-employment.” *Journal of Political Economy* 108 (3): 604–631.
- Han, S., and G. Li. 2011. “Household borrowing after personal bankruptcy.” *Journal of Money, Credit and Banking* 43 (2-3): 491–517.
- Herkenhoff, K., G. Phillips, and E. Cohen-Cole. 2021. “The Impact of Consumer Credit Access on Self-Employment and Entrepreneurship.” *The Journal of Financial Economics*, vol. forthcoming.
- Hochberg, Y. V. 2015, June. Pages 25–51 in *Accelerating Entrepreneurs and Ecosystems: The Seed Accelerator Model*. University of Chicago Press.
- Holtz-Eakin, D., D. Joulfaian, and H. S. Rosen. 1994. “Sticking it out: Entrepreneurial survival and liquidity constraints.” *Journal of Political Economy* 102 (1): 53–75.
- Hombert, J., and A. Matray. 2017. “The real effects of lending relationships on innovative firms and inventor mobility.” *The Review of Financial Studies* 30 (7): 2413–2445.
- Howell, S. T. 2017. “Financing Innovation: Evidence from RD Grants.” *American Economic Review* 107 (4): 1136–64 (April).

- Howell, S. T., T. Kuchler, D. Snitkof, J. Stroebel, and J. Wong. 2021. “Racial Disparities in Access to Small Business Credit: Evidence from the Paycheck Protection Program.” Technical Report, National Bureau of Economic Research.
- Huber, K. 2018. “Disentangling the effects of a banking crisis: Evidence from German firms and counties.” *American Economic Review* 108 (3): 868–98.
- Hurst, E., and A. Lusardi. 2004. “Liquidity constraints, household wealth, and entrepreneurship.” *Journal of Political Economy* 112 (2): 319–347.
- Hurst, E., and B. W. Pugsley. 2011. “What do small businesses do?” *Brookings Papers on Economic Activity*, pp. 73–143.
- Iyer, R., A. I. Khwaja, E. Luttmer, and K. Shue. 2016. “Screening Peers Softly: Inferring the Quality of Small Borrowers.” *Management Science* 62 (6): 1554–1577.
- Jayaratne, J., and P. E. Strahan. 1996. “The finance-growth nexus: Evidence from bank branch deregulation.” *The Quarterly Journal of Economics* 111 (3): 639–670.
- . 1998. “Entry restrictions, industry evolution, and dynamic efficiency: Evidence from commercial banking.” *The Journal of Law and Economics* 41 (1): 239–274.
- Jensen, T. L., S. Leth-Petersen, and R. Nanda. 2022. “Housing collateral, credit constraints and entrepreneurship-evidence from a mortgage reform.” *Journal of Financial Economics* 145 (2): 318–337.
- Kerr, S., W. R. Kerr, and R. Nanda. 2022. “House prices, home equity and entrepreneurship: Evidence from US census micro data.” *Journal of Monetary Economics, forthcoming*.
- Kerr, W. R., and R. Nanda. 2009. “Democratizing entry: Banking deregulations, financing constraints, and entrepreneurship.” *Journal of Financial Economics* 94 (1): 124–149.
- Kortum, S., and J. Lerner. 2000. “Assessing the Contribution of Venture Capital to Innovation.” *RAND Journal of Economics* 31 (4): 674–692.
- Krishnan, K., D. K. Nandy, and M. Puri. 2015. “Does financing spur small business productivity? Evidence from a natural experiment.” *The Review of Financial Studies* 28 (6): 1768–1809.
- Lastrapes, W., I. Schmutte, and T. Watson. 2021. “Home equity lending, credit constraints and small business in the US.” *Economic Inquiry*, 10.

- Lelarge, C., D. Sraer, and D. Thesmar. 2010. "Entrepreneurship and credit constraints: Evidence from a French loan guarantee program." In *International differences in entrepreneurship*, 243–273. University of Chicago Press.
- Lerner, J. 2000. "The government as venture capitalist: the long-run impact of the SBIR program." *The Journal of Private Equity* 3 (2): 55–78.
- Lerner, J., and R. Nanda. 2020. "Venture Capital's Role in Financing Innovation: What We Know and How Much We Still Need to Learn." *Journal of Economic Perspectives* 34 (3): 237–61 (August).
- Mills, K., and B. McCarthy. 2014. "The state of small business lending: Credit access during the recovery and how technology may change the game." *Harvard Business School Working Paper*, vol. 15-004 (July).
- Mills, K. G. 2019. *Fintech, Small Business the American Dream: How Technology Is Transforming Lending and Shaping a New Era of Small Business Opportunity*. Palgrave Macmillan.
- Moskowitz, T. J., and A. Vissing-Jørgensen. 2002. "The Returns to Entrepreneurial Investment: A Private Equity Premium Puzzle?" *American Economic Review* 92 (4): 745–778.
- Murfin, J., and K. Njoroge. 2015. "The implicit costs of trade credit borrowing by large firms." *Review of Financial Studies* 28 (1): 112–145 (January).
- Musto, D. 2004. "What Happens When Information Leaves a Market? Evidence from Post-bankruptcy Consumers." *The Journal of Business* 77 (4): 725–748.
- Petersen, M. A., and R. G. Rajan. 1994. "The benefits of lending relationships: Evidence from small business data." *Journal of Finance* 49 (1): 3–37.
- Puri, M., and R. Zarutskie. 2012. "On the life cycle dynamics of venture-capital-and non-venture-capital-financed firms." *The Journal of Finance* 67 (6): 2247–2293.
- Rajan, R. 1992. "Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt." *Journal of Finance* 47 (4): 1367–400.
- Robb, A. M., and D. T. Robinson. 2014. "The capital structure decisions of new firms." *The Review of Financial Studies* 27 (1): 153–179.

- Samila, S., and O. Sorenson. 2011. “Venture Capital, Entrepreneurship, and Economic Growth.” *The Review of Economics and Statistics* 93 (1): 338–349.
- Sapienza, P. 2002. “The Effects of Banking Mergers on Loan Contracts.” *The Journal of Finance* 57 (1): 329–367.
- Schmalz, M. C., D. A. Sraer, and D. Thesmar. 2017. “Housing collateral and entrepreneurship.” *The Journal of Finance* 72 (1): 99–132.
- Schnabl, P. 2012. “The international transmission of bank liquidity shocks: Evidence from an emerging market.” *The Journal of Finance* 67 (3): 897–932.
- Stein, J. 2002. “Information Production and Capital Allocation: Decentralized versus Hierarchical Firms.” *Journal of Finance* 57 (02): 1891–1921.
- Stiglitz, J. E., and A. Weiss. 1981. “Credit rationing in markets with imperfect information.” *American Economic Review* 71 (3): 393–410.
- Yimfor, E. 2021. “Brokers and Finders in Startup Offerings.” Working paper 3511164, SSRN.

Table 1: SBO Startup Capital

Notes: This table shows the results on SBO Startup capital

	All employer firms				
	1-9	10-49	50-99	100+	
Share using some capital for startup	92%	95%	94%	93%	
Among those using startup capital, share that used at least some personal / family savings or assets	85%	75%	76%	94%	
Among those using startup capital share that used at least one form of external finance	50%	64%	62%	73%	
Business loan from bank	19.7%	31.3%	33.1%	40.4%	
Business loan/investment from family/friends	4.5%	7.0%	6.0%	8.1%	
Personal/family home equity loan	7.0%	8.5%	7.6%	7.1%	
Business credit card(s) carrying balances	4.8%	3.9%	2.3%	2.5%	
Personal credit card(s) carrying balances	10.1%	7.9%	6.0%	4.8%	
Investment by venture capitalist(s)	0.4%	0.9%	1.5%	2.4%	
Other source(s) of capital	3.7%	5.0%	6.0%	7.6%	

Table 2: SBO Expansion Capital

Notes: This table shows the results on SBO Expansion capital

	All employer firms	1-9 employees	10-49 employees	50-99 employees	100+ employees
Share that used any capital for expansion or making capital improvement(s)	53%	50%	61%	70%	77%
Share that used at least some internal finance for expansion or capital improvements	53%	55%	49%	50%	49%
Personal / family savings or assets	35%	39%	26%	19%	12%
Business Profits or Assets	18%	16%	22%	31%	37%
Share that used at least one form of external finance for expansion or capital improvements	46%	45%	51%	49%	50%
Business loan from bank	20.0%	16.5%	27.8%	33.7%	37.5%
Business loan/investment from family/friends	1.6%	1.6%	1.9%	1.6%	0.8%
Personal/family home equity loan	4.2%	4.5%	3.9%	2.2%	1.0%
Business credit card(s) carrying balances	10.3%	11.1%	8.8%	5.0%	2.8%
Personal credit card(s) carrying balances	7.8%	9.0%	5.5%	2.8%	0.9%
Investment by venture capitalist(s)	0.4%	0.3%	0.6%	0.9%	1.9%
Other source(s) of capital	1.8%	1.5%	2.1%	2.9%	4.8%

Table 3: SME Finance Monitor Sources of Capital

Notes: Use of Finance among existing SMEs, as reported in 2016 Q3 to 2021 Q2 waves of UK's SME Finance Monitor Survey

	All	0	1-9	10-49	50-99	100-249
	SMEs	emp	emp	emp	emp	emp
USE OF EXTERNAL FINANCE*	53%	37%	49%	60%	68%	68%
Core products (any)	45%	30%	40%	50%	62%	62%
- Bank overdraft	25%	17%	22%	26%	37%	36%
- Credit cards	24%	14%	19%	29%	36%	39%
- Bank loan	14%	7%	13%	17%	21%	26%
- Commercial mortgage	5%	1%	3%	6%	9%	10%
Other forms of finance (any)	28%	14%	24%	36%	39%	41%
- Leasing or hire purchase	20%	7%	15%	26%	32%	35%
- Loans from directors, family & friends	5%	3%	6%	6%	5%	6%
- Equity from directors, family & friends	2%	1%	2%	3%	3%	3%
- Invoice finance	4%	1%	2%	6%	7%	8%
- Grants	6%	4%	6%	7%	6%	7%
USE OF TRADE CREDIT**	54%	31%	51%	66%	64%	67%

USE OF EXTERNAL FINANCE*: current use of external finance

USE OF TRADE CREDIT**: regularly use of trade credit