1. Building small business utopia: how artificial intelligence and Big Data can increase small business success

Karen G. Mills and Annie V. Dang

1.1 INTRODUCTION

Alex hears a chime, looks up from her espresso machine, and glances at the clock. Her coffee shop opens for the day in half an hour. As she finishes steaming her milk, she leans over to check her phone and investigate the source of the sound. It's a notification from her Small Business Insights dashboard: "Alex, it's time to order new water filters, descaling powder, and cleaning tablets for your annual spring cleaning." Alex walks over to the café's counter and consults her dashboard. She clicks the reminder on the home screen and takes a sip of her coffee as the machine quickly analyzes her past buying behavior and scans for the best deals online. She then reviews the bot's suggestions for purchases. Seeing that she is getting a great price and the fastest shipping available, Alex happily taps the "buy" button. In a split second, her order is placed, and the real-time cash flow projections on the right side of her screen update to reflect the latest expense.

With 15 minutes to go before the shop opens, Alex takes a moment to review the messages in the "employee" tab of her dashboard. There are two alerts that require her attention. It looks like Sean, a barista, cannot make his shifts this weekend. The platform received his request for a shift trade last night, pinged available employees based on their schedules, and found a replacement who could handle the busy weekend hours. All Alex has to do is approve the switch. Alex then asks her dashboard to estimate what her cash will look like after she pays her employees this week. The projections look positive, so she authorizes the machine to send out paychecks tomorrow morning.

The second alert informs Alex that she may need a loan at the end of the month. The town is holding a summer fair and her business will be featured with its own booth. She will need to pay for extra employees that weekend to staff both the café and the booth, and she will need to make additional inventory purchases of ice and coffee beans for cold brew, as the weather is sure to be warm. "Don't worry!" Alex's bot chirps. "It looks like you'll need about \$4000 to prep for the fair, but you are preapproved for several loans and the terms are good. We can touch base again in a week."

Alex returns to the "home" screen and scans the various graphs predicting cash flow and highlighting future spikes in spending. Her dashboard bot, an animated coffee mug, pops up on the screen to give her a weekly industry update: "Alex, as I mentioned to you last month, cafés

in your area are increasingly stocking alternative milk options. The number of local coffee shops offering oat milk has increased by 35 percent in the last two weeks. Do you want to start stocking oat milk as well?” Alex and her baristas have noticed more customers requesting this option. She tells the bot to go ahead and order enough for the next two weeks based on other cafés’ usage levels, and to track the customer uptake. “Fantastic!” the bot responds. “I will order enough for two weeks and show you how well it sells. If it is popular, I will find you a permanent oat milk supplier.” Alex takes another sip of her cappuccino and releases a contented sigh, ready to start the morning shift. She taps the “open” button on her dashboard and smiles as the LED sign at the front of the shop comes to life.

This is a normal day in the life of Alex, our coffee shop owner. In many respects, she begins her day in the same way as generations of small business owners before her, with an eye to her customers, her employees, and her cash reserves. Yet, something has changed. In an era marked by advanced technologies like artificial intelligence (AI) and machine learning,¹ Alex possesses data-driven tools and insights into her small business that have previously only been available to larger firms. Her dashboard instantaneously collects and analyzes information about her café, and integrates it with e-commerce platforms, her payroll provider, her point-of-sale system, and the best practices of similar businesses in her region. It not only aggregates existing data on her business, but also offers real-time insights and automated decisions that can increase sales and help Alex access credit to avoid a cash crisis.

In this chapter, we explore how technology can change the game for small business owners in two important and related ways: by giving them information on how to run their business, and by providing them with access to the capital they need to grow and prosper. Both developments are rooted in the ability to seamlessly gather relevant digital information about a small business from multiple avenues and to translate that data into useful insights about the business’s prospects, benefitting borrowers and lenders alike. By constructing an integrated, intelligent financial ecosystem—which we call “Small Business Utopia”—these technological breakthroughs have the potential to transform businesses like Alex’s café and the entire small business world.

Small businesses play a critical but often overlooked role in nearly every economy. They have been plagued by difficulties in obtaining capital due, in part, to cumbersome banking systems that tend to favor larger clients and are slow to innovate when it comes to small business products. In recent years, however, new technologies have begun to revolutionize the financial services sector and small business lending, in particular, has proven ripe for change. Financial technology firms, or “fintechs,” have entered the small business lending market in droves, where they compete with traditional banks and spur them to rethink their long-standing approaches to small business. The innovations generated in this dynamic environment are creating more opportunities for creditworthy small businesses to access capital and complementary tools like Alex’s dashboard, leading to greater small business longevity and success.

Although this is an exciting and positive set of developments, the use of Big Data, AI, and machine learning is not without risk. Inherent in the automation of tasks and processes is the decline or removal of human oversight with potentially negative, albeit unintended, consequences. These risks present a challenge for regulators and policymakers around the world, as they must rethink outdated principles and create “smart” regulation to address inevitable questions of data access and ownership, data transparency, and data security. The issues associated with technology are not insignificant and the stakes are particularly high when it comes

to financial data. However, if the evolution of policy and regulation can responsibly meet the pace of technological change, the rewards for small businesses and for overall economic prosperity could be transformative.

1.2 SMALL BUSINESS IS IMPORTANT TO THE ECONOMY

Small businesses form the lifeblood of many economies. Half of the people who work in the United States (US) own or work for a small business.² Notably, however, the proportion of people employed by small businesses in the US is near the lower end for developed economies. In the European Union (EU), micro, small, and medium-sized businesses make up two-thirds of employment (e.g., 72 percent in Spain, 64 percent in Denmark, and 54 percent in the United Kingdom).³ The sheer number of small firms and their workforces in the US and in Europe underscores their significance to their respective economies.

Despite these substantial employment numbers, small businesses are often excluded from policy conversations and economic models, which tend to focus elsewhere: on consumers, on investments made by bigger businesses, and on government spending. It is therefore not surprising that relatively few measurements and tools exist in either the public or private spheres to track the impacts of technology on the critical small business sector. However, a growing body of research powerfully demonstrates that small businesses, especially new and young firms, are vital for employment growth, productivity, and innovation.⁴

In many respects, the world of the small business owner has exhibited minimal change over the last 50 to 100 years. Small businesses focus on their products and services, and they devote much of their energy to customers and employees. They often use cash for transactions and keep paper records. This leaves these business owners with little capacity to gather analytical information and glean business insights beyond their personal experiences and wisdom gained from years of operation. Combined with the reality that many small businesses operate with thin margins and low cash buffers, this helps explain why small business failure rates are so high—less than half of US small businesses survive beyond five years.⁵ In fact, a study by U.S. Bank found that 82 percent of small businesses in the US fail due to cash flow problems.⁶ With access to relevant data and the ability to translate that information into meaningful insights, all of this could change.

Twenty-first century technologies have dramatically disrupted and revolutionized the ways in which we live and work—from how we communicate to how we shop and seek entertainment. They have allowed small businesses to diversify their sales channels beyond brick-and-mortar stores in a shift towards advertising and selling online and over social media. Technological advancements have also occurred in the financial services sector in the form of digital currencies, real-time payments, and mobile bank applications. Moreover, there are no signs that the pace of change is slowing, as the coronavirus pandemic has led customers to seek out contactless digital banking experiences as opposed to physical branch interactions.

One particular innovation has proven pivotal in transforming the financial services sector: the development of application programming interfaces (APIs)⁷ by banks, accounting platforms, and infrastructure software companies. APIs allow multiple streams of data to be accessed and integrated into innovative products and services. Financial institutions then use AI and machine learning to transform this newly available data into actionable insights that inform credit underwriting models and reduce operating costs by increasing the speed and

accuracy of predictions. As they gain traction, APIs and the applications they enable can benefit both lenders and their small business customers by improving an area of historical difficulty: access to capital.

1.3 ACCESS TO CAPITAL

In 2009, the world found itself in the midst of a monumental financial crisis, one that would have lasting ramifications for the banking system and alter our understanding of the economic role of small businesses. The global financial crisis hit small enterprises disproportionately hard. Why? At its core, the 2009 financial crisis was a credit crisis. Banks had become over-extended on mortgages and effectively curtailed lending to small firms, which were deemed riskier and less profitable to serve. This signified a devastating turn for small businesses, which are particularly dependent on credit to survive. When the lending dried up, millions of small businesses throughout the world failed, leading to a massive decline in small business employment. In the first quarter of 2009 alone, the US lost 1.8 million small business jobs.⁸ The crisis taught a painful but valuable lesson: small businesses are important to the economy and access to capital is critical for small businesses.

Since the financial crisis, researchers have sought to better understand why small businesses were so sensitive to the economic downturn. They identified a number of reasons, the most striking of which is the fact that small businesses have extremely low cash buffers, with the median US small business holding only 27 days of cash. This means that at any point in time, the typical small business only has enough cash for less than a month of expenses and other outflows. If a customer were to pay late or if the business were to experience a disruptive event, such as an external economic or health crisis, the delay or loss of revenue could be life-threatening. Businesses in certain industry verticals are even more vulnerable—retail stores only have 19 days of cash on hand and restaurants have only 16 days.⁹ These low cash reserves highlight the importance of seamless access to credit and real-time cash management for the health and survival of small businesses.

1.4 BARRIERS AND FRICTIONS IN SMALL BUSINESS ACCESS TO CAPITAL

For generations, the process of small business lending has remained fairly static despite technological advancements and widespread gravitation towards digital interfaces and experiences. A small business owner seeking a loan typically photocopies a pile of paperwork, walks down the street to their banker, hands over the documents, and then waits weeks or even months to receive a decision. Often, the banker makes several requests for additional information or asks the business owner for a personal guarantee or some form of collateral. Even after such a comprehensive review and agonizing wait, the banker might still say “no,” leaving the business to begin again with yet another lender. This slow process presents a major problem for small businesses, which depend on timely access to capital to offset their slim cash buffers. On the other side, lenders are focused on minimizing losses, which has traditionally required a meticulous, time-intensive assessment of the business to ensure it is a risk they are willing to assume. Two distinct structural frictions make the small business lending process especially challenging for banks: *information opacity* and *heterogeneity*.

1.4.1 Information Opacity

Information opacity refers to the fact that it is incredibly difficult to look inside a small business and conclude whether it is creditworthy. It is relatively easy, for instance, to gather ten data points about a single consumer and decide whether that person should get a mortgage. The same amount of data on a small business, however, fails to provide a similar level of clarity. Information about a business is buried in tax filings, bank statements, sales records, and other financial data, making it difficult for lenders to determine how much money the business is actually making. Often, the small business itself does not even know if it is profitable. However, as large quantities of small business data are digitized and made available, technologies like AI, machine learning, and predictive modeling can make it easier to gather and analyze actual business activity, creating a smoother, better-informed underwriting process.

1.4.2 Heterogeneity

The second friction inhibiting small business lending is heterogeneity. All small businesses are different, not only in terms of the kind of business and the customers served but also in terms of their financial profiles. A recent categorization of small businesses in the US highlights the heterogeneity inherent in small firms (Figure 1.1).¹⁰ Of the 30 million US small businesses, 24 million do not have employees. These are the sole proprietors, freelancers, and members of the gig economy—a growing segment in the US and other parts of the world. Another four million small businesses are characterized as “Main Street” businesses. These are the car repair operations, restaurants, and cafés that embody the spirit of the community while also creating a significant number of jobs and providing a path to economic mobility. More than one million US small businesses operate in supply chains, selling their products and services to other businesses or the government. Only a tiny proportion of the 30 million small businesses in America—around 200,000—are high-growth startup firms on track to become the next Google or Amazon. In this chapter, we do not address the last category, as high-growth firms access a separate capital market (e.g., venture capital) from the vast majority of other small businesses, which borrow from banks and similar financial services providers.

Source: Mills (2019).

Figure 1.1 Categorization of small businesses in the United States

The diversity of small businesses has long been a source of friction preventing banks from establishing effective credit models. One day, the client is a retail shop on Main Street, while the next day it may be a dentist or a packaging supplier. For each type of business, the credit file looks quite different, making it challenging for a loan officer to develop widely applicable expertise. New technologies can significantly reduce this barrier. Imagine a lender that has the ability to access and interpret the financial profiles of 1000 dry cleaners. This lender will find it easier to assess whether the 1001st dry cleaner being considered for credit can operate profitably and ultimately repay a loan. In the US, Live Oak Bank is one financial institution that has successfully used industry data to build underwriting expertise in specific sectors. The bank gained traction by focusing on distinct verticals—first, veterinarians, then poultry farmers, and eventually funeral homes and other kinds of businesses—developing algorithms attuned to the credit characteristics of each segment.

1.5 A CASE STUDY IN INNOVATION: FINTECH

The period from 2010 to 2015 saw a burst in innovation and the rise of a new breed of digital lender: financial technology firms, or “fintechs,” which leverage AI and machine learning to accelerate underwriting. Early entrants, like Lending Club, started with consumer lending. They mounted a formidable challenge to traditional banks with streamlined online applications and quick response times. Small business lenders like Kabbage and OnDeck followed, using alternative cash flow data from borrowers’ bank accounts to conduct credit assessments. Their automated processes cut loan decision times from weeks to minutes, with funds entering a small business’s bank account in a matter of days. Despite the high interest rates charged on these loans, the ease of the application process and the rapid turnaround held massive market appeal.

The fintech entrants delivered a better customer experience by automating previously manual processes, including data collection, risk modeling, and credit decisions. This proved beneficial in tackling a critical gap in the small business lending market: small-dollar loans. More than 78 percent of US small businesses seek loans of less than USD 250,000 and nearly 40 percent want loans of less than USD 50,000.¹¹ For banks using a traditional underwriting process, these loans are simply not profitable, leading to a high level of unfulfilled credit needs, especially among the smallest businesses.¹² Fintechs and other tech platforms took note, targeting the small-dollar loans that banks refused to make. Lenders like Square, PayPal, and Intuit QuickBooks went on to deliver billions of dollars in credit to hundreds of thousands of small businesses. To date, Square has originated USD 6.3 billion in loans with an average loan size of less than USD 6000.¹³

As additional fintech challengers entered the field, market commentators boldly predicted that David (the fintechs) would kill Goliath—that the traditional banks had had their day. However, the financial services landscape that emerged from the period of heightened activity in the early 2010s proved more complex than initially anticipated. Fintechs faced several key disadvantages. Without established brands and trusted reputations, they found it difficult to locate customers. It is hard to reach small businesses at the precise moment when they need a loan. Their heterogeneity means they do not all engage with the same types of media or congregate naturally in one place, such as an industry convention. Small business owners do not have time to search for and compare lending options, as they are busy actually running their

businesses. Therefore, the fintechs' marketing costs were exceptionally high, reaching more than 40 percent of revenue at times.¹⁴

On the other hand, traditional banks, especially local community banks, tend to hold long-standing, trusted relationships with their small business clients. They have natural avenues to interact with and cross-sell different services to their customers. Banks also possess a second major advantage in the form of access to low-cost deposits to fund their loans. New entrants relied on expensive funding sources, often from risk-capital providers like hedge funds. This significantly increased the costs of their loans and made some of their offerings dangerously high-priced for small business owners.

1.6 THE SMALL BUSINESS LENDING LANDSCAPE

After a few fast-paced years of fintech growth, the banks woke up and decided that they would not cede the small business market to the new competitors. Large banks in particular had the resources to invest in technology and construct their own data-driven tools.¹⁵ The fintechs had largely improved the front-end customer experience—an innovation that banks and tech companies discovered they could replicate.

The small business lending landscape evolved into a competitive arena with four primary sets of players: traditional banks, fintech challenger banks, Big Tech platforms, and fintech infrastructure companies. Large and small banks recommitted to small business loans and services, increasingly pursuing a digital-first strategy. They invested heavily in automated products, like Bank of America's mobile chatbot "Erica" and HSBC's branch banking bot "Pepper." Challenger banks based on purely digital experiences, as opposed to physical branches, continued to enter in droves—including Radius Bank and Chime in the US; NorthOne in Canada; Nubank in Brazil; Revolut, Starling, OakNorth, and Monzo in the UK; N26 in Germany; and Judo in Australia. The third category of competitors, large technology players including Amazon, PayPal, Square, Stripe, and Intuit QuickBooks, all developed successful small business lending arms thanks to their customer reach, strong technical expertise, and superior user experience. The fourth group, fintech infrastructure players, catered to the emerging technology needs of the other three segments, building API pipelines to feed the data in a standardized format into lending algorithms and business analysis tools. They included data aggregators like Plaid and Yodlee in the US, and TrueLayer and Bud in the UK.

With a crowded field of players all vying for a piece of the market, the scene has been set for a real transformation in small business lending. Banks and fintechs, armed with new data on small businesses funneled through APIs, are focused on turning the information streams into actionable insights using AI and machine learning. These insights offer immense value for lenders—they can lower the cost of traditional underwriting and make the process more efficient overall, while also opening the door to a new suite of innovative products and services aimed at helping small businesses access capital (Figure 1.2).

Even more revolutionary has been the growing realization that these same information streams and credit algorithms could change the game in a separate but related way—the insights could be made directly available to small business owners in the form of a dashboard or some other tool that provides information on both current and forecast cash flows, thereby equipping small businesses with a clearer view of their finances.

Figure 1.2 *The use of AI and machine learning in financial services*

1.7 SMALL BUSINESS UTOPIA

On the main street in Brunswick, Maine—aptly named “Maine Street”—sits a string of reddish-brown brick buildings housing local small businesses, from restaurants to boutiques to running apparel shops. At the end of one block, with a conspicuous white clapboard storefront, lies a charming taproom called Moderation Brewing Company. The business’s owner, Mattie, recently offered some insight into the difficulties she experiences when trying to sort out her pub’s finances. At the end of a long shift, she goes home, sits on her bed, and evaluates her business’s financial health. On her laptop, she loads her accounting software. On her tablet, she logs into all of her business’s bank accounts. On her phone, she pulls up her credit card statements. Then she brings out her paper spreadsheets and tax documents. By the time she is finished, she has six or seven screens open and loose-leaf sheets sprinkled across the bed.

Many business owners like Mattie struggle to manage their finances and understand their cash flows while simultaneously running their business. How revolutionary would it be if these time-intensive tasks were automated and combined into a single, user-friendly dashboard? Today, APIs can power the kind of integrated tool that Alex seamlessly navigated at the start of this chapter. Previously disparate sources of data can be gathered into a central place for analysis and help small business owners make informed decisions. This data-driven ecosystem has the potential to be so transformative that we have named it “Small Business Utopia.”

In this “Small Business Utopia,” information from the point-of-sale system, the payroll portal, the accounting platform, tax preparation software, and bank accounts would all be integrated. In addition, staffing and recruiting tools could be linked to the dashboard and thereby automate personnel management, including shift-assignment changes, job postings, and even employee healthcare benefits. A key functionality of this hypothetical dashboard would be the cash flow predictor, which would use historical sales and expense data as well as owner input to forecast cash usage and predict potential shortfalls.¹⁶

This real-time intelligence could also be used by banks or other lenders to underwrite more quickly or even proactively. Imagine a small business with a cloud of preapproved credit floating over its head. The Small Business Insights platform might tell Alex, “I see that you will need USD 4000 in two weeks to pay for seasonal supplies. Don’t worry—you are preapproved for a loan of that amount. Press here and it will be available in your account today.” This deep and shared understanding of cash flows between lenders and borrowers would help small businesses avoid life-threatening liquidity crises and ensure that they obtain the right kind of loan—one that fits their business in terms of amount, duration, and cost—at the precise moment they need it.

Lenders also stand to benefit greatly from this new technology ecosystem. If small business owners can access capital and insights that enable them to run their businesses more successfully, they will be less likely to fail. This would reduce the risks that bankers face in small business lending by minimizing defaults and allowing banks to decrease their costs for loan reserves. In turn, they could pass these savings on to customers in the form of lower interest rates, creating a virtuous cycle in small business banking.

Moreover, the lender could return to the role of relationship banker. Instead of spending hours with a client asking for information and analyzing financial records in a manual underwriting process, lenders could utilize real-time data to better understand loan needs and ability to repay. The time savings would allow the lender to sit down with small business owners and engage in substantive conversations regarding their businesses, including the need for expansion capital and other long-term goals. In a world where many fear that automated machines will ultimately replace certain jobs, the concept of “Small Business Utopia” could mark a return to human interaction and the lasting importance of relationship banking.

“Small Business Utopia” may be closer than we think. Companies like Intuit QuickBooks are already using AI to drive a suite of interactive products and tools, like the Cash Flow planner, which forecasts a small business’s future income and expenses, while also tracking other aspects of operations, such as invoice and payroll activity.¹⁷ The insights generated by tools like the Cash Flow planner could allow for more accurate evaluations of a business’s creditworthiness. However, despite the potential for these innovations to bring positive change to the world of small business lending, we must resist the appeal of rose-colored glasses. The proliferation of such technologies must be accompanied by an in-depth public discussion of how the data that power them is gathered, used, and regulated.

1.8 THE DARK SIDE OF THE BLACK BOX

Research has shown that gaps exist in traditional lending markets due to a lack of banking services in certain regions or systemic barriers that prevent particular populations from accessing credit.¹⁸ One estimate of the size of the gap in the US can be explored by examining the portfolio of the US Small Business Administration (SBA). This government agency provides credit assistance to the nation’s small businesses by guaranteeing approximately 75 percent of each loan in situations where banks need additional credit support to grant loan approval. The SBA’s portfolio is large—more than USD 100 billion—and over-indexes in women- and minority-owned businesses, which provides an indication of where market imperfections occur. Given that the loss rate on the portfolio is less than 5 percent (i.e., 95 percent of

SBA-guaranteed loans are paid back), it is clear that the vast majority of these small businesses are creditworthy. Nevertheless, they are overlooked in the current banking environment.

Of course, it is not the case that every small business should get a loan. Some businesses seeking funds are struggling because they do not possess a good business model or their product fails to fulfill a market demand. These firms should not receive loans, because when they do go out of business, the debt becomes an additional obligation that must be repaid. The ultimate goal is for all *creditworthy* businesses to obtain the capital they need to operate and succeed. Technology has the power to fill some of the existing market gaps by better identifying and funding these creditworthy businesses.

However, the rewards promised by the use of innovative technologies in financial services inevitably come with significant risks. This is the “dark side of the black box.” Even as improved lending algorithms provide access to capital to more deserving businesses, no formula is infallible. In AI and machine learning circles, the mantra “garbage in, garbage out” expresses the reality that outcomes from predictive models are highly dependent on the inputs. Algorithms often learn from past behavior and data, so what happens when the data itself is biased? What if the machine takes in previous loan records and decides that it should not lend to small businesses operating in certain geographies? This could lead to a shortage of investments and opportunities in traditionally underserved areas and exacerbate market inequities. Currently, women- and minority-owned businesses tend to receive fewer loan approvals relative to their proportion of business ownership.¹⁹ An automated decisioning system biased by historical information could miss opportunities to lend to these creditworthy borrowers.

Another set of issues revolves around data transparency. What if a business owner who believes they are a good risk is rejected for a loan? Are they able to look inside the algorithm to understand what portions of the application raised red flags? What if a business owner’s credit history has an error in it? Does the applicant get to correct that mistake? As the model learns from the data it is fed and continually updates itself, is it even possible to isolate and identify the determinants of the outcome? How do we ensure that the relevant regulatory parties develop the expertise needed to accurately and effectively analyze algorithms for just outcomes? Moreover, who ultimately owns the data?

1.9 REGULATION

Responsibility for addressing these questions lies with financial regulators. In the wake of the 2009 global financial crisis, regulation was enacted in direct response to the overextension of banks’ balance sheets. Financial institutions bemoaned the resulting compliance burdens and lobbied fiercely for their relaxation. As the regulatory conversation moves to address the new technological advancements in financial services, this outdated binary view of “less versus more” regulation is counterproductive. An increasingly connected digital world calls for “smart,” forward-looking financial services regulation, where the focus shifts to the real and pressing issues concerning data access and ownership, data transparency, and data security.

1.9.1 Data Access and Ownership

To build a “Small Business Utopia,” financial services firms need access to a great deal of data. Therefore, a regulatory environment conducive to innovation must promote, rather than

restrict, data access, while keeping small business protections front of mind. The extensive use of data aggregation in financial services, especially in underwriting, raises a crucial question: Who owns the data? Regulators in the EU answered that question in 2015 with the passage of the Revised Payment Services Directive (PSD2), which clearly states that customers own their data.²⁰ PSD2 requires incumbent banks to share financial information with third parties, such as fintechs, when requested to do so by their clients.

The UK took these regulations a step further in January 2018 by launching the Open Banking Standard, which mandated that Britain's major banks share their data with permitted third parties in a standardized and secure API format.²¹ These explicit regulations around data ownership and data access may be one reason why the UK is home to so many innovative fintech startups. More recently, the Financial Conduct Authority (FCA), a UK regulatory body, solicited input on the concept of Open Finance, an extension of Open Banking principles beyond banking to other financial services, such as insurance, mortgages, and investments.²²

The UK standard has served as an important model for the rest of the world. In the last few years, several countries have begun to implement their own Open Banking regulations, including Japan, Singapore, Australia, and Mexico. The adoption of Open Banking regulations in the US and across the globe is essential for ensuring the development of the kinds of products and services described in this chapter. When consumers and small businesses have more control over their financial data and can permit creative new firms to securely access that information, more innovation will result.

1.9.2 Data Transparency

The shift towards greater use of data in financial services raises issues around visibility into the data itself and the way it is used to make decisions. If a business owner's loan application is rejected, there should be full transparency as to why, so the borrower can understand the shortfalls in their business, correct any errors in their credit file, and take steps to improve. The fintech firms that emerged from the financial crisis distinguished themselves from traditional players through the sheer volume of data gathered and their ability to interpret it for use in underwriting and fraud detection. These data sources, which are often nontraditional, range from the amount of time spent filling out the loan application to the small business owner's social media activity. While many firms have taken care to eliminate markers like race, gender, and other protected categories from their inputs, the US and many other jurisdictions lack clear and enforceable regulations governing the use of algorithms and defining the degree to which regulators can oversee and monitor their inputs and outputs. This has led to significant anxiety regarding the potential for these credit models to have unintended disparate impact, especially for women- and minority-owned businesses. Therefore, concretely defining the role of financial regulators in ensuring that these new technologies neither replicate nor exacerbate current biases in small business lending—even as they widen access to credit—is of the utmost importance.

As these technologies become more widely used, financial regulators will face thorny questions regarding their right to access and evaluate private companies' predictive models, especially when their outcomes may be discriminatory. What is the legal basis for a regulator to look inside the black box? What parts of a lender's underwriting code are proprietary? Can the regulator determine whether the discriminatory result was due to the algorithmic model,

the data itself, or some combination of both? What level of responsibility should the lender bear? Regulators continue to grapple with these questions, but there is agreement on several foundational principles: (1) Regulatory agencies need to develop additional expertise to monitor AI and machine learning activity in financial services; (2) The algorithms should be explainable and transparent; and (3) Better measurement of small business lending outcomes will help identify market gaps and potentially discriminatory activities.

1.9.3 Data Security

Regulatory discussions concerning data ownership and transparency must also consider the related issue of data security. It is essential to protect a small business owner's sensitive financial information. If the data are misused or breached, where does the liability fall? In the UK, Open Banking determined that the banks' responsibility ends with the transfer of the data to a third party. The FCA only authorizes firms to receive the data if they can demonstrate that they have the requisite protocols in place to prevent data leakages. Other countries without Open Banking standards, such as the US, lack clarity regarding liability in data transfer.

Regulators face an enormous challenge as they attempt to balance both the benefits and risks of new financial technologies. They must proactively foresee issues and put preemptive back-stops in place, keeping in mind that while small businesses stand to gain greatly from innovations in financial services, they must also be protected from bad actors and hidden biases.

1.10 PREDICTIONS FOR THE FUTURE

The story of David and Goliath is still running its course. Only time will tell who among the traditional banks, fintechs, and tech platforms will emerge victorious in the realm of small business lending. As we look towards the future, three primary questions will determine the winners and losers: (1) Who has the customers and the recognized brands; (2) Who has access to low-cost capital; and (3) Who has the best technology and talent?

Banks and Big Tech companies have a natural advantage in the future of small business lending due to their trusted name recognition. Banks, in particular, have the added benefit of access to low-cost capital from deposits. As consumer margins continue to be squeezed, banks will increasingly view small business lending as an important market and take the necessary steps to stay competitive. Although fintech challenger banks are equipped with innovative technologies, they depend on expensive capital from investors, which often translates into exorbitantly high interest rates on small business loans. As they lack well-known brands, they are forced to spend much of their money on customer acquisition. Recognizing that such business models may be unsustainable, many fintechs are actively pursuing partnerships with banks to gain access to their balance sheets and customers. Their partner banks, meanwhile, benefit from insights into the fintechs' groundbreaking technologies.

One thing is certain: the ultimate winners in this shifting environment will be the world's small businesses. By harnessing the power of new technologies, financial services providers can fundamentally reinvent how small businesses access the capital they need to start, scale, and succeed. In the optimal future state, all creditworthy small business owners will be able to obtain a loan that meets their specific needs. There will be less disparity in which businesses obtain capital, and fewer small businesses will fail because they will possess the tools needed

to anticipate and withstand cash crises. Small businesses seeking credit will enjoy a better customer experience and loan costs that are commensurate with their risk. They will spend less time filling out and worrying about loan applications, and get back to doing what they do best—running their small businesses and contributing to national growth and productivity.

1.11 CONCLUSIONS

Small business lending has a long history. The concepts of credit, lending, and borrowing can be traced back more than three thousand years to the Third Dynasty of Ur in Mesopotamia. Cuneiform clay tablets unearthed from that time tell the story of a rich economic society highly versed in the extension of capital to bakers, builders, farmers, fishermen, scribes, and shepherds to fund their business operations—from acquiring land to purchasing inventory.^{23, 24, 25}

A 59-tablet archive illuminates the financial dealings of Turam-ili, a head merchant in the Ur III period. Turam-ili took on the role of a banker, overseeing other merchants and the “bala,” which was a central account to which merchants made deposits of silver, grains, building materials, and other goods that could then be lent out to surrounding businesses and used for various financial transactions.²⁶ In one text, Turam-ili provided a loan of silver to Nur-Adad, another merchant, with interest set at 20 percent. A beer brewer, on the other hand, received a loan of barley at an interest rate of more than 33 percent.²⁷

Small business owners today would find many of Turam-ili’s activities familiar despite the vast stretch of time between them. The dynamics of small business lending have remained so consistent over the centuries precisely because the operations of small businesses, at their core, have not changed. Like entrepreneurs today, the small business owners of 3000 years ago needed capital to operate and grow their ventures. Their profit margins were not large enough to fund big purchases, making lending and borrowing a necessary aspect of the financial ecosystem. Just like contemporary small businesses, they experienced inherent frictions and barriers in obtaining loans.

But now, millennia after the first small business loans were recorded, it is possible we have arrived at a transformative moment for small businesses and the way they access capital. In the past, the macroeconomic misconception that small businesses do not contribute substantially to the economy has led to policy missteps and the perpetuation of a “small business paradox”—politicians and government officials frequently proclaim the importance of small businesses in campaign agendas and soundbites, but often fail to implement meaningful policies to help them grow and prosper. However, two major crises in the twenty-first century—the 2009 credit crisis and 2020 global coronavirus pandemic—have underscored the economic significance of small businesses and revealed the fundamental need to serve them better.

The COVID-19 crisis thrust small business cash flows into the spotlight, demonstrating how devastating forced closures could be for businesses dependent on foot traffic and social interaction. Governments across the globe responded quickly, pouring hundreds of billions of dollars into small businesses. Several European nations opted to provide aid through direct government payments. Elsewhere, relief funding was predominantly distributed by banks, such as the US Paycheck Protection Program (PPP) and the UK Coronavirus Business Interruption Loan Scheme (CBILS).

These efforts have signaled an increased understanding of the small business sector and its distinct needs. But there is more work to be done. Small businesses are the backbone of the

global economy and they form the fabric of our communities. Novel innovations in technology built on the availability of data and AI can address the underlying issues that have historically hampered lenders and ensure that creditworthy borrowers can access the capital they need to succeed. The resulting “Small Business Utopia” ecosystem will empower small businesses to make better financial decisions as tools like Alex’s dashboard become a reality. With decisive actions by policymakers and regulators, the next phase of change can mean that fewer small businesses fail and more entrepreneurs can pursue their dreams.

NOTES

1. Artificial intelligence, or AI, is the ability of machines to work intelligently—to analyze data and make decisions based on their analysis. Machine learning is the process by which computers, after initial programming or the introduction of a certain algorithm, continue to learn based on newly introduced data sets. AI systems often use machine learning to suggest solutions to defined problems. For example, many small business lenders use AI in their underwriting processes, where they test and iterate on their algorithms to predict the risk and creditworthiness of potential small business borrowers. These lenders often rely on the data set of previous loans and their outcomes, and use machine learning to adjust the algorithm (e.g., reassigning weights to certain factors) as more data becomes available.
2. US Small Business Administration Office of Advocacy (2019), “Frequently Asked Questions,” accessed June 1, 2020, at <https://cdn.advocacy.sba.gov/wp-content/uploads/2019/09/24153946/Frequently-Asked-Questions-Small-Business-2019-1.pdf>. The US Small Business Administration defines a small business as any independent business with fewer than 500 employees.
3. European Commission (2019), “2019 SBA Fact Sheet & Scoreboard,” accessed June 1, 2020, at <https://ec.europa.eu/docsroom/documents/38662/attachments/1/translations/en/renditions/native>; “2019 SBA Fact Sheet: Spain,” accessed June 1, 2020, at <https://ec.europa.eu/docsroom/documents/38662/attachments/27/translations/en/renditions/native>; “2019 SBA Fact Sheet: Denmark,” accessed June 1, 2020, at <https://ec.europa.eu/docsroom/documents/38662/attachments/8/translations/en/renditions/native>; “2019 SBA Fact Sheet: United Kingdom,” accessed June 1, 2020, at <https://ec.europa.eu/docsroom/documents/38662/attachments/29/translations/en/renditions/native>. In the European Union, “micro” firms are defined as those with 0 to 9 employees, “small” firms have 10 to 49 employees, and “medium” firms have 50 to 249 employees.
4. See Decker et al. (2014); Kerr et al. (2014); Acemoglu et al. (2013); Haltiwanger et al. (2013); Van Praag and Versloot (2007).
5. US Small Business Administration Office of Advocacy (2016).
6. Desjardins (2017).
7. Application programming interfaces, or APIs, is a general term used to describe the software protocols that allow third-party developers or firms to gain access to shared data and build tools and integrations on top of that data.
8. Authors’ analysis of data from the US Bureau of Labor Statistics, “Table E. Quarterly net change by firm size class, seasonally adjusted.”
9. Farrell and Wheat (2016).
10. See Mills (2019); Delgado and Mills (2020).
11. Federal Reserve (2020).
12. See Mills (2019).
13. US Securities and Exchange Commission (2020).
14. In 2015, Lending Club’s sales and marketing costs totaled 40 percent of revenue. OnDeck’s costs reached 24 percent of revenue. See Lending Club (2016); Securities and Exchange Commission (2015).
15. In 2019, JPMorgan Chase spent the most money on technology out of all US banks, setting aside USD 11.4 billion for its tech budget. Bank of America was second at USD 10 billion and Wells Fargo was third at USD 9 billion. From DeFrancesco (2019).

16. Numerous technology companies are already developing or offering these kinds of “Small Business Utopia” tools. For example, Bank of America released its Business Advantage 360 small business cash flow predictor in February 2019, and payroll provider Gusto has recently expanded into health-care and other human resource integrations.
17. QuickBooks (2020).
18. See Stein et al. (2010); Robb and Morelix (2016); Fairlie and Robb (2010).
19. See Barr (2015); Robb (2013).
20. European Commission (2015).
21. Open Banking Implementation Entity, “What is Open Banking?”
22. Financial Conduct Authority (2019).
23. Garfinkle (2004).
24. Goetzmann (2016).
25. Powell (1996).
26. Van De Mieroop (1986).
27. Garfinkle (2002).

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