

# New directions in entrepreneurship research with the Kauffman Firm Survey

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**Abstract** Data is a fundamental impediment to a better understanding of the multifaceted process of new firm creation. With better data, we can form a better understanding of the causes, constraints, and outcomes associated with the decision to launch a new business. Towards this end, the Kauffman Foundation commissioned an eight-wave panel of businesses that were formed in 2004, chronicling a single cohort's evolution from birth through important business milestones. This issue of *Small Business Economics* focuses on papers that use the Kauffman Firm Survey to examine new research questions in entrepreneurship. Articles in this issue analyze new research topics in entrepreneurship as well as shed light on enduring questions in the literature.

**Keywords** Kauffman Firm Survey · Entrepreneurship research · Firm creation

**JEL classification** L26

## 1 Introduction

Entrepreneurial activity is a crucial component of economic growth, both in the USA and abroad. As researchers, building accurate and in-depth insights into

the development and sustainability of startups is perhaps the most important way that we can enhance the effectiveness of entrepreneurship and encourage innovative and new business enterprises. However, acquiring accurate data on the dynamics of new businesses can be very challenging. It can be difficult to conduct surveys on new businesses for a number of reasons. One of the biggest challenges researchers encounter relates to the availability of the business owners, and securing their full cooperation can be very problematic. A further issue associated with research of this nature is that there is a lack of consensus as to what constitutes a new business and definitions of new enterprises can be subjective. In addition, longitudinal surveys that seek insights into the dynamics of how new businesses develop over time are often limited due to high levels of business attrition.

To address these challenges, the Ewing Marion Kauffman Foundation—whose overriding objective is to advance entrepreneurial activity in the USA—sponsored the development of the Kauffman Firm Survey (KFS), a longitudinal survey that was designed to fill the current gaps in understanding related to the development and sustainability of new businesses. To ensure that the study was reliable, the Kauffman Foundation commissioned Mathematica Policy Research to design and implement a robust study that provided policymakers, business leaders, and data users with solid quantitative-based insights into entrepreneurial activities. Specifically, the objective of the KFS was to generate reliable information about how high-technology and women-owned businesses develop, the financial expectations of the owners of these

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businesses, and the enterprise and owner characteristics that are the best indicators of sustainability.

A core advisory group was formed to oversee the study and this group agreed that the KFS would need to be underpinned by the following key requirements:

1. The data collection would be limited to a “pure” group of new enterprises that were formed in the same year.
2. The information collection process would focus on the business, not owner, level.
3. The primary analytical objective would be to collect financial data related to the formation of the business.
4. The survey would need to take the form of a longitudinal study to ensure the objective of generating solid insights into business development and sustainability were achieved.

To ensure that each of these requirements were met, the researchers employed a methodical and comprehensive process to manage any procedural challenges that emerged in relation to developing and applying the inclusion criteria, formulating a survey that precisely assessed the primary components of business development, and securing adequate levels of participation in the research.

The KFS monitored businesses that were formed in 2004 on an annual basis for 8 years. Through tracking the participating businesses in this way, it was possible to monitor how the enterprises evolved to an extent that would not have been possible via cross-sectional snapshots alone, which are classically employed in research of this nature.

The dataset that was collated as part of the KFS provides researchers with in-depth information that can be employed to assess a cohort of new businesses from their startup phase through to their ongoing development or, in some cases, exit. The longitudinal data that was collected during this research study covers a wide range of topics including startup financing, the products and services traded, innovations developed, and the primary demographics of the business owners. A further advantage of the panel is that it was established in advance of the most recent recession; as such, the cohort can also be employed to assess how relatively young businesses were impacted by this recession.

## 2 The KFS in this issue

The versatility of the KFS is on full display in this special issue, which features nine articles exploring different dimensions of the entrepreneurship experience with KFS data. The articles were part of a two-part conference sponsored by the Kauffman Foundation and held at Duke University and the University of Colorado in 2015 and 2016.

### 2.1 The role of geography

Three papers in the issue exploit geographic variation in the data to explore important questions that connect entrepreneurship to broader social forces. Braggion, Dwarkasing, and Ongena (2017) explore how regional inequality affects entrepreneurs’ decisions to seek outside funding. They measure regional inequality by using zip-code level data from the IRS that allow them to construct a Gini index of dividend income. In areas with greater financial inequality, entrepreneurs are less likely to apply for a loan. They are more likely to report that they are afraid their applications will be turned down, and as a result, they use more of their own funds to finance their ventures. In more unequal areas, there are fewer banking establishments, this effect being stronger during the 2007–2008 financial crisis.

Vedula and Kim (2017) take the subject of geography in a totally different direction by focusing on how the pace of life in a region is related to entrepreneurial activity. To measure pace, they pull together a wide range of data sources that allow them to capture five dimensions of regional tempo: economic well-being, industrialization, population size, climate, and culture. While we typically think of entrepreneurs as non-conformists who buck the trends around them, we find evidence suggesting that regional pace of life actually sets the tempo for business owners and influences the amount of time they spend working on their ventures.

Finally, Shu and Simmons (2017) explore how the regional concentration of industry is related to the survival of startups, and how this interacts with the human capital characteristics of startups. Firms started by founding teams with more experience are more likely to survive in general, but this effect is weaker in areas with higher local concentrations of related industrial firms. Their work highlights the importance of accounting for location decisions when evaluating the human

capital of founder teams, precisely because local conditions help to determine the outside options to entrepreneurship that the founders face.

## 2.2 Startups in the global marketplace

Two papers in the issue break new ground on the subject of how startups use internationalization as a component of their business strategy. McCormick and Fernhaber (2017) explore patterns in internationalization among the smallest and youngest possible enterprises. Quite surprisingly, they find that a non-trivial fraction of new businesses attempt to reach international markets in their earliest days as a new business.

Their work explores how entrepreneurial perceptions impact international growth. Drawing on organizational learning and performance feedback theory, they test for a “U-shaped” relationship between internationalization and performance. Namely, those who perceive the venture has fallen below or exceeded growth expectations are substantially more likely to internationalize than those entrepreneurs who simply feel that their growth expectations have been met. The relationship they find is more pronounced among innovative micro-sized ventures than non-innovative ones. This U-shaped relationship supports the idea that internationalization is a combination of two types of entrepreneurs: unprepared novices making risky moves in a struggle to catch up and success stories making a strategic decision to push beyond their initial boundaries.

The empirical challenge associated with disentangling these two groups lies in the fact that new ventures self-select into internationalization, creating an endogeneity problem. Faribozzi and Keyhani (2017) tackle this endogeneity head-on with instrumental variable strategy that uses whether a firm sells a product or a service as an instrument for internationalization. The key idea behind their instrument is that firms selling products are more likely to internationalize than firms selling services, but the choice between product and service has no impact on survival. After controlling for self-selection, they find that internationalization is, on balance, a net positive for the firms that do it, and that early internationalization is better for post-internationalization survival than late internationalization.

## 2.3 Innovation and exit

One of the enduring questions in entrepreneurship research concerns the role that new business formation

plays in the process of innovation—in other words, in understanding why it is necessary to form a new business in order to undertake new innovations. This issue also contains two papers that explore the connections between innovation and exit outcomes for young firms. Understanding the dynamics of exit is a critical piece of the innovation discussion because selling a firm to an acquirer is a major source of liquidity for the early-stage investors who finance this innovation.

Cao and Im (2017) explore the linkages between founder characteristics and R&D search intensity. They find that founder human capital, which they define as the combination of formal education, same-industry work experience, and prior entrepreneurial experience, is positively related to the R&D search intensity of new technology ventures. Thus, more innovative people, broadly construed, spend more time pursuing innovation in their startups. However, this tendency diminishes during the Great Recession, a fact which connects their work to the Shu and Simmons (2017) piece discussed above by showing that the outside options available to entrepreneurs are important for shaping their behavior as entrepreneurs.

Cotei and Farhat (2017) explore how young businesses become targets for M&A transactions. In particular, they focus on the way that exit is shaped by their innovative capabilities and their employment growth. They find that the mode of organization is critical for understanding exit outcomes. Higher innovation and employment growth make it more likely that young corporations will become acquisition targets, but this is not true of sole proprietorships. They also find that serial entrepreneurs are more likely to sell their businesses through M&A transactions. Partly, this reflects the signaling content of the choice of organization, but it also reflects the fact that firms with external investors are almost exclusively organized as C-corporations. In most cases, these external investors need to see the company sold or taken public in order to earn a return on their initial investment.

The issue concludes with a technical overview of the KFS by Farhat and Robb (2017). Their work provides a user guide for researchers who wish to understand better the statistical issues associated with the complex sample design of the KFS data. Indeed, the KFS employs an extremely sophisticated sampling design, which includes multi-frame sampling, stratification, adjustment for survey nonresponse, and oversampling to provide sharper inferences of under-represented subpopulations.

Each of these design elements improves the efficiency with which researchers analyze and draw inferences from the available data. But this efficiency comes at a cost: complex sample designs can make data analysis more complicated due to non-independent selections and selection with varying probabilities. Their work demonstrates the importance of taking the features of a complex survey design into account during the data analysis process by showing how failing to take into account the probability-based weights impact the parameter estimates and the resulting standard errors. Farhat and Robb (2017) is an essential reference for researchers who intend to build on the literature spawned by the KFS with new empirical work.

### 3 The KFS in previous work

#### 3.1 Defining performance

When studying firm performance, the majority of research studies have focused on firms as the unit of analysis. This approach can be very advantageous if the objective of the research is to identify methods by which more efficient, successful, and long-lasting nascent ventures can be developed. By comparing the attributes of different firms, we can better understand the characteristics of an ideal entrepreneur and the optimal setting in which to start a new venture. When assessing performance, the KFS data can be used to not only determine the predictors of positive performance but also to determine which variables are the best indicators of success.

The most straightforward representation of performance within the KFS data is the continuation of a new venture's ability to do business, often referred to as survival. Thus, the majority of existing studies in this domain have employed survival as at least one of their dependent variables when assessing performance. For example, Coleman et al. (2013a, b) explores factors affecting the survival using the KFS data. They found that the fundamental resources that contribute to survival are the intangible assets in the form of education, work, and life experience, and the tangible assets in the form of adequate levels of financial capital at startup. Meanwhile, Crawford and Kemelgor (2011) focused on increasing the longevity of new firms and found that human capital, as measured by education, team formation, and experience, positively impacted the

survival of nascent ventures. In another study that focused on survival as the measurement of success, Welsh et al. (2011) compared the survival rates of franchises, new businesses, and purchased independent businesses. The results indicated that, although franchises and new businesses encountered different challenges in terms of longevity, franchises and purchased businesses exhibited many similarities, although franchises faced their own distinct obstacles during their first year of business.

The second most used dependent variable to indicate performance has been the profitability of a firm, which presents advantages over survival because it is a quantitative as opposed to binary variable. Profitability data can be more difficult to acquire; however, studies can take advantage of the continuous nature of this variable in their findings, allowing for more nuance of the independent variables to be measured. In one such study, Dzathor (2013) considered the characteristics that affect profits and found that a firm's business legal structure, nature of the product, and technological orientation had a direct impact on the profitability of a firm. However, these results were inconsistent as they were only statistically significant in years 2 and 4 of the life of a new venture.

Several authors have described performance as a combination of firm viability and profitability. For example, Braymen and Neymotin (2014) focused on the performance of young businesses within immigrant or ethnic enclaves. A direct correlation between the survival and profits of nascent ventures and the owner's level of connection to the community was identified. Cavarretta and Robb (2009) similarly defined firm performance as a combination of the firm's ability to stay in business and remain profitable. However, the authors focused on the traits of different firms in the form of team, founder, and context characteristics to determine the impact these factors had on the mean and variability of the firm's performance.

Several other dependent variables have been utilized as measures of firm performance, albeit at a lower frequency than survival or profits. These variables also focused on the firm as the unit of analysis, defining performance in terms of factors such as growth, productivity, funding, competitive advantage, and positive or negative exit routes. Competitive advantage was unique among these variables as the authors treated it as a composite of human capital, innovation, marketing, and licensing-in, with results suggesting that

government guarantees and government equity support positively contributed to the formation of a competitive advantage for firms (Pergelova and Angulo-Ruiz 2014).

### 3.2 Resources: human and financial capital

An overwhelming number of the articles that considered firm performance did so by focusing on the role of the founder in creating a successful or unsuccessful venture. This was measured most frequently through human capital, measured in some combination of education, work experience, age, hours worked, or number of founders. For example, Dzathor et al. (2013) used KFS data to discover that founder human capital (age, industry experience, hours worked per week, and education) had a significant impact on the profitability of the firm only during the first and fourth years of operation, indicating that these are crucial years in the life of a firm, whereas human capital can have the biggest impact on the success of a nascent venture.

Research has found that human capital also affects the exit route of ventures that decide to discontinue their business, and the number of hours per week that the founders work is the best predictor of a successful exit by either merger or acquisition (Lee and Lee 2014). Coleman et al. (2013a, b) focused on the service industry and found that entrepreneurs with more startup experience were more likely to experience a positive exit in this industry, although surprisingly, founders with more intellectual property had a higher probability of undergoing a negative exit when they were in a non-service industry. Additionally, industry experience was also found to be positively related to a firm meeting or exceeding growth expectations (Cassar 2014).

Cavarretta and Furr (2011) took a different approach to examining the influence that resources have on firm viability and value, focusing on the effects that human and financial capital had on both the means of startup performance and the variability. The results suggested that, while having access to a wealth of resources had a small effect on mean performance, it had a much larger influence on the variability, indicating that having access to more resources increased the range of outcomes, positively as well as negatively. Although there is a general assumption that the more resources firms have access to the more successful they will be, this is not always the case. Lee and Zhang (2011) found that while loans increase the survival rates of young businesses, equity actually lowers their longevity.

Similarly, having access to multiple sources of credit has been found to reduce the survival rate of firms; however, the firms that did survive experienced higher rates of growth (Mueller and Dubofsky 2014). Despite these difficulties, financing is always in high demand, which is why Zarutskie and Yang (2015) measured the effects of the Great Recession on the availability of financial capital, finding that the recession severely impacted access to capital as well as slowing the growth of firm revenues and employment, even after the end of the recession (Zarutskie and Yang 2015).

### 3.3 Minority business owners

One of the most prevalent ways that the KFS dataset has been utilized is in the study of minority business owners, which is made possible due to the fact that it contains extensive longitudinal data on entrepreneurs of differing backgrounds. A great example of a study in which this data was taken advantage of was that of Ortiz-Walters and Gius (2012), who discovered that the race of the founder in combination with access to different types of funding had profound effects on the revenue-expense ratio of young firms. Specifically, Hispanics, blacks, and Asians all achieved lower business profits than white business owners. However, blacks and Hispanics achieved more profitability when they used personal debt, whereas Asians obtained better profits when they utilized business loans. Despite the differences in firm profitability of minority business owners, Cheng (2014) demonstrated that controlling for the founder, establishment, and regional characteristics of firms removed any significant differences that race, gender, or immigrant status had on business closure.

Although black business owners have repeatedly been proven to experience reduced access to commercial financing, controlling for this fiscal tool reveals that no significant differences exist in the viability of firms that have black ownership (Gai and Minniti 2014). Similarly, according to Gai and Minniti (2009), while founder age, education, number of hours worked per week, and the use of commercial financing are positive indicators of firm survival, there is an insignificant correlation between founder race and venture longevity.

In addition to race, the KFS data has also been used to consider differences between male and female entrepreneurs. One study found that female-owned nascent ventures are more likely to close during the first 3 years of operation than their male-owned counterparts (Robb



and Watson 2010). The authors determined that this may be due to the fact that female entrepreneurs tend to be younger and operate smaller businesses. However, in a subsequent study, the authors concluded that once factors such as industry, experience, and hours worked were controlled for, very few differences in the survival rate of male- and female-owned firms could be observed (Robb and Watson 2012).

### 3.4 Strategy

Founders can also try to gain an advantage over their competitors by focusing on their firm's strategy, opening up a wide range of possibilities for improvement. While both an innovative strategy and team members with human capital are valuable in the performance of young firms, these can be costly and in high demand, making them difficult or even impossible for young ventures to obtain (Ye et al. 2009). Another tactic that some entrepreneurs use in an attempt to improve their business is the implementation of motivation-enhancing human resource (MHR) practices such as competitive compensation, benefits, incentives, and other similar methods of encouraging employee morale. These practices are expensive in the short-term but allow for greater subsequent firm growth and productivity, especially in a post-revenue, growth goal stage (DeGeest et al. 2016). Similarly, research has found that MHR practices can also mediate the effects of nascent venture resources on firm survivability, which is a relationship that seems to grow stronger with the age of the firm (DeGeest et al. 2015).

Among the multitude of strategies that can give firms an advantage, expanding business internationally is one of the more difficult objectives to achieve; however, studies indicate that an international presence can provide the edge that a new venture needs to outdo the competition. In fact, young firms that have international sales have been found to enjoy a more predictable revenue stream as well as higher levels of efficiency (Baek and Neymotin 2015). In addition, immigrant-owned firms have lower survival rates, which can be partially mitigated by an early internationalization strategy (Jiang et al. 2016).

Unsurprisingly, the efficiency with which firms can utilize their resources is a key factor in the tactics that a business can pursue. This makes resource allocation a core subject to investigate when considering the strategies of different firms. This can be seen when founders attempt strategic resource investments in conjunction

with deploying decisions in situations in which it is most efficient to follow the norms set by rivals and deviating often results in a negative impact on the performance of the firm (Symeonidou 2013). In addition, firms have a higher chance of survival if they focus on a specialization strategy. This allows them to direct resources to one specific area of a new business's capabilities and represents a more successful tactic for achieving longevity than flexible, but widespread, resource allocation (Symeonidou et al. 2014).

### 3.5 Legitimacy

One valuable tool that young businesses must build to be successful is legitimacy; i.e., employees, customers, investors, etc. must have the perception that the firm can provide valuable contributions to its community and that the team is both cohesive and productive. Batchelor and Burch (2011) investigated the effects of employer, customer, and financial legitimacy as predictors of firm value. They found that while customer legitimacy was not significant, the results did indicate that employer legitimacy is an accurate indicator of growth for the first 3 years of the existence of a young business. After the first 3 years, employer legitimacy falls off as an indicator, and financial legitimacy inherits the role of predicting firm value. Firm legitimacy is an interesting subject of study as it can be defined in a multitude of ways, allowing for unique ways to assess the perception of firms. For instance, Wang (2009) focused on cognitive, regulative, and normative legitimacy, finding that all three were positive indicators of firm survival and, as such, be taken into consideration in the founding strategy. Building on these findings, Wang et al. (2014) performed an analysis of the benefits of earning early customers with firm legitimacy, and the findings suggested that early customers can be valuable assets that represent cognitive or regulative legitimacy. However, acquiring customers during the first few years of the life of a business can take significant investment, and this approach should only be considered if there are high anticipated payoffs.

### 3.6 Regional analysis

Yet another factor to take into consideration when assessing the success of entrepreneurs is the location of the firm and the overall entrepreneurial success of that area. Doms et al. (2010) found that well-educated entrepreneurs are more likely to found a firm in an urban

setting that offers a more educated workforce, and similarly, educated areas have higher levels of entrepreneurship. In a different approach to using location, Bates and Robb (2014) examined minority ownership of small firms, firm location in minority areas, and the targeting of minority clientele as a basis for predicting the likelihood of small businesses' longevity. The findings indicated that firms that primarily serve minority clientele neighborhoods have higher rates of firm closure and lower profitability. Furthermore, firm location in conjunction with the previous experience of the founder and the sector of the firm have a significant effect on the survival rate of a firm. The results indicated that location can have a decisive impact on firm survival; however, the results become less straightforward when founder experience and firm sector are taken into consideration (Renski 2015).

Doms et al. (2010) found that education rates among entrepreneurs help to predict growth, with a 4-year college degree being positively associated with the business outcomes of revenue, employees, profits, and assets. Additionally, industry experience has been found to be positively related to a firm meeting or exceeding growth expectations (Cassar 2014). Further, government guarantees and government equity support positively contributed to the formation of a competitive advantage for firms (Pergelova and Angulo-Ruiz 2014).

### 3.7 Strategic choices in young firms

The KFS data have also been used to examine the strategic choices the owners of young ventures make. These choices include the legal form of the business, the quantity and quality of jobs created, R&D investments, internationalization, and successful exits. For example, Welsh et al. (2011) found that founders with industry experience are more likely to buy or start a new venture, rather than start a franchise business, and only about a third of companies are incorporated as sole proprietorships; the majority are LLCs or corporations.

Hurst and Pugsley (2011) used KFS data to understand growth patterns in young firms and found that 60% of surviving firms did not add employees over the initial 4-year period and that 97% added fewer than ten employees. They further noted that about 85% of businesses did not acquire a patent, trademark, or copyright, suggesting they were not generally focused on innovation as a central component of their business. The size, slack resources, and proximity to government

also affected the quality of jobs as measured by the provision of health and retirement plans to employees (Litwin and Phan 2013); however, only about 23% of young firms surveyed in the KFS offered health insurance to their employees (Shane 2009). In addition to job creation and quality, researchers have used KFS data to examine commitments to R&D, finding that firms that used equity financing, had a founder with a Ph.D., and had proprietary technology were more likely to engage in R&D activities.

Further, R&D efforts and international ties (via being foreign born) have been found to be positively related to internationalization decisions in the first 4 years of a firm's life (Braymen and Neymotin 2014). Verbeke et al. (2014) similarly found that being foreign born and having prior entrepreneurial experience and education were positively related to early internationalization.

The KFS data have also allowed researchers to examine drivers of successful exits in young firms. Harkins and Forster-Holt (2014) found that sole proprietorships, full-time engagement of the founder, and home-based businesses were less likely to have a successful exit (i.e., merged or sold), while those in high-tech industries were more likely to have a successful exit.

### 3.8 Empirical considerations associated with studying young ventures

The KFS data have also been used to identify important measurement considerations in young firms. For example, revenues and employees of young ventures measured with the KFS exhibit power law, rather than normal distributions; this can have important considerations for how these outcomes are modeled in entrepreneurship research (Crawford et al. 2015; Crawford et al. 2014). Additionally, Fried and Tauer (2015) used the KFS data to develop an entrepreneurial performance index (EPI) that evaluated the efficiency with which entrepreneurs translate total costs and hours into revenue, which may have utility for other researchers who wish to model performance.

### 3.9 Financing decisions

The KFS captures the financing decisions of nascent firms at an unprecedented level of detail. This has allowed scholars to explore the interconnections

between the financing channels for startups and a wide variety of firm, founder, and market characteristics.

The work by Robb and Robinson (2012), which explored the financing choices of startups using KFS data, is one of the most widely cited papers in this area. They developed a categorization scheme that allows the financing choices captured by the KFS to be organized according to whether the type of capital is debt or equity and whether the source of the capital is the owner, firm insiders (other employees or family members), or outsiders, including banks, to the firm. This creates a  $2 \times 3$  matrix of financing decisions that can be summarized as follows:

A taxonomy of financing decisions for startups

	Debt	Equity
Owner	Personal credit cards Personal loan to the business from an owner	Cash injected into the business from personal savings or investments
Insider	Family loans to business founders or other owners	Equity provided by parents or spouses of founders and other owners
Outsider	Personal loans to owners from banks or other financial institutions Business loans Business credit cards Business lines of credit	Angel financing Venture capital Equity from government or other businesses

Because founders provide personal guarantees for business loans and use their personal assets as collateral, it is difficult to delineate between the assets of the firm and its founders. Indeed, limited liability is not a salient feature of many startups. Thus, one of the biggest challenges associated with developing a taxonomy of early-stage financing decisions lies in dealing with the fact that, for many startups, the balance sheet of the founder and the firm are often co-mingled. The taxonomy provided by Robb and Robinson (2012) addressed this issue by focusing on the ultimate source of the capital.

Using this taxonomy, they found that approximately 40% of a firm's founding capital structure comes from outside debt. This debt itself comes from a variety of sources. Around 70% comes in the form of bank loans. On average, this is split roughly evenly between loans to the individual and loans to the business itself, but Coleman et al. (2014) found that immigrants, home-based firms, and firms founded by those with a lack of work experience were less likely to be funded through business loans and more likely to be funded through

personal debt. Business credit lines make up about 10% of the total outside debt of a startup. A relatively small amount comes from sources like credit cards. Cotei and Farhat (2017) examine how startup businesses finance their operations over time and found that firms with high R&D activity and those that possess intellectual property rights finance their operations predominantly with equity—particularly external equity raised from angels and venture capitalists—and business debt—particularly bank loans and credit lines.

Because of the importance of debt for startups, a number of papers have examined the role that business credit scores play in the process of fundraising, especially among constituencies that have been historically underserved by the banking system. Turning first to minority-owned businesses, Henderson, Herring, Horton, and Thomas (2015) provided evidence that the business credit scores of black-owned businesses are lower than those of white-owned businesses, on average, and pointed out that this is a likely due to the lower amount of startup capital that black-owned businesses receive. Fairlie, Robb, and Robinson (2017) demonstrated that a large fraction of the difference in funding levels between black-owned and white-owned businesses could be attributed to differences in credit scores; however, they expanded on this by reporting that many black business owners do not apply for credit for fear of denial even when their businesses possess strong credit ratings. For example, they found that black business owners in the upper quartile of the credit score distribution were more than twice as likely to report that they did not apply for capital than a white founder that had a below-median credit score for fear of denial. Perhaps in keeping with this sentiment, Bates and Robb (2013) reported that minority-owned businesses were more likely to be rejected for loans than white-owned businesses (although Bates and Robb [2016] found no evidence to suggest that businesses operating in urban, heavily minority, inner-city areas face worse conditions than other minority borrowers).<sup>1</sup>

Turning from minority-owned businesses, similar patterns in financing have been found when examining women-led businesses. Coleman and Robb (2009, 2010a, b) showed that women-owned businesses start smaller than male-owned businesses and continue to raise less outside capital throughout their early years of

<sup>1</sup> One potential reason for this may be the Community Reinvestment Act of 1977, which compels financial institutions to serve low- and moderate-income areas. See Bates and Robb (2014).



operation. During the crisis, women-led firms are more likely than male-led firms to encounter financing difficulties (Thébaud and Sharkey 2016), which suggests that financial crises disproportionately affect those communities that struggle the most with financial access in the first place. This would be consistent, for example, with the view that female- and minority-led businesses are more expensive borrower clienteles for banks to service. Nonetheless, Neeley and van Auken (2010) found that female-led businesses rely on bootstrapping to a similar degree as male-led firms; however, they may encounter different constraints based on factors such as the size of the credit lines that are available.

In contrast to debt, the KFS data suggests that equity plays a relatively modest role in new firm financing for most startups. Robb and Robinson (2012) reported that relatively few firms rely on outside equity in their founding year; however, those that do, use it as a significant source of capital. Zaleski (2011) found that, among KFS firms, having prior entrepreneurial experience is one of the most important indicators of a firm's ability to obtain external equity.

Equity is a more important source of capital for technology-oriented firms, which typically raise more capital, on average, than any other type of firm (Coleman and Robb 2012). Given the importance of technological innovation for economic growth, especially among startups, a natural and important question to ask of the KFS data is how the financing decisions of early-stage firms differ based on whether they are high-tech firms. When Minola et al. (2013) examined the financial pecking order of technology startups, they found that firms with higher profits were less likely to rely on outside capital but that, among those that did, equity was more common than debt. Robb and Seamans (2014) found a similar result for firms that were R&D focused, regardless of their sector. Cassia and Minola (2011) found that the traditional pecking order flipped in 2007, which they argued suggested that dynamic considerations should be taken into account when considering pecking order theories. There is, indeed, a large amount of literature in financial economics that has argued for, and tested, dynamic pecking order models—see Frank and Goyal (2005) for an overview. This finding was also echoed by Coleman and Robb (2012), who found significant differences between technology and non-technology firms.

Cotei and Farhat (2016) utilized the KFS to study leasing decisions of startup firms and who business owners' use a variety of bootstrap financing methods

to acquire the needed resources necessary to survive and eventually grow their businesses. They found that startups with unique/specific assets have a lower propensity to lease whereas startups with high growth opportunities are more likely to lease their assets.

Connecting gender and technology orientation, Coleman and Robb (2010a, b) questioned whether the same patterns that could be observed among technology firms held among female-led technology firms. While the sample sizes were small, Coleman and Robb (2010a, b) found that women-led technology firms were less likely to possess intellectual capital, smaller, and less growth-oriented than male-led technology firms. This is noteworthy because one of the main explanations offered for the large average difference between male- and female-led firms is that female-led firms tend to cluster in low-growth industries like retail. Coleman and Robb (2010a, b) naturally controlled for this explanation by focusing only on a set of technology-oriented firms, within which growth aspirations and prospects were comparable.

#### 4 Moving forward from here

The work in this issue as well as the previous work spawned by the KFS illustrates the central role that high quality administrative data play in the investigation of fundamental questions related to the formation of new businesses. Although the KFS data have shed light on many central questions in entrepreneurship research, there is still much that the data can teach us.

The panel structure of the data make it uniquely well suited to understanding how startup activity was affected by the Great Recession.

In addition, the broad geographic and industry coverage of the dataset makes it well suited to studying questions related to regional economic development. What role do startups play in the process of urban renewal? To big, established firms pull startups into rapidly gentrifying areas, or is startup activity a leading indicator of subsequent gentrification? Understanding how startups fit into the broader social processes behind regional development is an important question.

Finally, the time-frame over which the KFS data were collected make it uniquely well suited to exploring questions related to the role that entrepreneurship plays in the changes in income inequality that we have seen in

the USA over the last generation. Many of these issues have been touched on by work that we have discussed in this article, but much more work lies ahead. We are optimistic that the KFS will remain a data source of enduring value to entrepreneurship researchers going forward who pursue these and many other topics central to the entrepreneurship experience.

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