

# Gender and Race in Entrepreneurial Finance

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## Abstract

Economic frictions pervade the founding, financing, growing, and exiting of high-growth entrepreneurial firms. This chapter considers one friction that currently affects a small, but important, set of entrepreneurs: racial and gender discrimination. I first collect facts from a large empirical literature that show clear gender and race gaps in participation and financing of startups. Female founders manage 16-25% of all startups, while Black entrepreneurs rarely exceed 3% of the startup population. Conditioning on startups that successfully raise external finance has little impact on these gaps. The complexity of the entrepreneurial process presents several opportunities for discrimination to manifest itself and produce this gap. The chapter details the major discrimination theories and the empirical methods used to test for their presence. It then provides an extensive review of a growing empirical literature in entrepreneurial finance that tests these models. The pattern of evidence reveals a nuanced and incomplete story about bias, information asymmetry, and differential treatment of underrepresented founders. The chapter ends with an extensive set of research ideas motivated by the gaps in the entrepreneurship literature and recent developments in theory and measurement of discrimination.

**Keywords:** Entrepreneurship, discrimination, gender, human capital, race, venture capital, private equity, entrepreneurial finance, statistical discrimination, stereotypes.

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# 1 Introduction

This chapter reviews the intersection of race, gender, and entrepreneurial finance with the broad goals of providing the background and citations for those interested in contributing to the field. Few academics or PhD students decide to read a chapter like this one without some previous interest in the topic signaled in the title and abstract. I will thus spare the reader a lengthy introduction that tries to generate excitement about a research topic while convincing them that no one has answered the important questions. Instead, let me briefly motivate the topic and then clarify the chapter's setting, objectives, and target audience.

Why do we need a chapter such as this? To start is Table 1, which shows the representation of women and minorities of all genders in the entrepreneurial finance market. I start with a normative statement that these numbers are too low. One need only compare the proportion of high-growth startups that are women-run (12-28%) to their population representation or labor force participation Calder-Wang and Gompers (45%, 2021) to see why this is called the “entrepreneurship gender gap.” Similar comparisons for Black entrepreneurs (1-10%) reveal similar gaps. The sources of these disparities are many and not necessarily an indictment on investor's preferences or bias. In fact, that is the whole point of many academic articles on the topic: what explains the disparities? Is it a skills gap, wealth inequality, educational differences, culture, norms, or investor bias? Or perhaps some historical institution led to differences in human capital that persist today. That said, an unspoken motivation throughout the remaining sections is equality of participation across all stages of the startup lifecycle. Why? Beyond how they correlate with characteristics like wealth, education and pre-entry economic characteristics, race, gender, ethnicity, and other innate characteristics should not predict participation or success in entrepreneurship ex-ante.

Recent events and controversies in the venture capital and private equity industry show that this topic is likely to be top-of-mind for practitioners and policy makers for years. Several investors and limited partners have reacted to these developments with resignations and firings. Others have taken a proactive approach to address concerns about under-

representation (Section 7.2). Understanding if and how demographic characteristics matter from startup founding to exit is critical to assessing the industry's progress.

Our setting is the financing of high-growth entrepreneurial firms in the United States. Many of the topics covered in the chapter apply to all small businesses, but several will be specific to venture capital, angel investors, and private equity. Berger and Udell (1998) show that the external financing of small businesses demands researchers' attention. They highlight the unique setting of entrepreneurial finance where insiders contribute a substantial amount of capital and tap the private equity markets as the firm develops. The high level of informational opacity distinguishes it from the public firm setting and plays an important part in understanding the financing lifecycle. This lifecycle involves multiple players—banks, angels, VCs, private equity firms—and thus presents situations where bias, stereotypes, and discrimination could affect underrepresented founders. The informational opacity found at nearly every stage only exacerbates the frictions underlying most models of discrimination.

## **Chapter objectives**

Here is what you should expect out of this chapter.

- It will present a framework for understanding how gender and race matter for startups raising capital from banks, angel investors, venture capitalists, or private equity firms. I present a simplified version of the entrepreneurial firm lifecycle and describe the major players.
- Summary of the motivating “facts” about participation of women and minorities in startups. After reviewing dozens of papers using disparate datasets, all the facts about firm formation, capital raising, growth, and outcomes needed to be collected one place.
- One faces a daunting and ever-expanding list of economic theory and review articles to read before testing theories or even building databases. Section 5 is thus a financial economist's summary of the economics of discrimination. It provides the citations, terminology, and models for researchers interested in testing the myriad alternative

explanations when exploring differential treatment by race or gender. When appropriate, the section attempts to tie the models' predictions to the entrepreneurial finance setting.

- Present a review of the contemporary literature in entrepreneurial finance—with an economics and finance bias—related to race and gender. This is the section you might skip to if you are seeking cites to add to your own project (though I cannot promise I did not miss some). Rather than put a list of citations and one sentence summaries of papers into paragraphs of text, the literature review attempts to connect the work and summarize its lessons for future work.
- The remaining sections of the chapter look forward and provide a guide for researchers interested in exploring topics in the area. It presents recent and ongoing changes to the financing and entrepreneurship landscape. These changes could change the race and gender “facts,” while providing useful variation for testing theories. The main section of the chapter ends with a list of unanswered questions and unexplored sub-areas that demand more attention.
- The Appendix provides references for data sources, methods for assignment of race and gender, and a review of methods used to detect discrimination.

As will be clear as you proceed through the chapter, I devote more time to gender issues than to race. This focus is not a statement about relative importance. Instead, it is a by-product of several factors. The literature across fields has spent considerable time on gender relative to race. Part of this attention stems from data constraints because gender is more often recorded and measured with minor error. Similarly, minority participation rates (whatever their causes) are often so low that standard regression estimation has weak statistical power. Next, several of the models of entrepreneurial entry, preferences, risk, and stereotypes better map to gender than race. Simply, it is more difficult to connect historical or social events to clear—though perhaps unintended—to differences between genders, but

there are clear connections for race and ethnicity. As we discuss in Section 6, there is a lot of room in the literature for studies on race and ethnicity.

Beyond its overview of the economics of entrepreneurship, Parker (2018) provides an extensive survey of topics around female and minority entrepreneurship. His review extends beyond this chapter's focus on the U.S. private equity and startup markets, so I encourage interested readers to look there for international evidence.

## **1.1 Intended audience**

I write this chapter for two audiences. First, I aim to provide a literature review and “facts assessment” for practitioners and policymakers who do not have the will or time to review dozens of academic papers. Sections 1-2 achieve this, while Table 1 summarizes the baseline facts. The second audience—research faculty, PhD and masters students—will find these sections only part of the story. Here, I aim to provide a resource for those who seek to conduct research at the intersection of private equity and discrimination broadly speaking. Numerous members of this audience will have financial and economic theory mastered, yet lack knowledge of the unique institutional setting of private equity and high-growth entrepreneurship. These readers may also have less experience with the rich and extensive discrimination literature in labor economics. Section 6 summarizes research on economics and econometrics of discrimination and bias, which forms the foundation of the main literature review. The review of the economics of discrimination literature in Section 6 can guide observational studies or experiments, but should not be viewed as a comprehensive literature review of that field (see comprehensive reviews cited).

## **1.2 Entrepreneurs and firms**

The set of entrepreneurial firms raising external finance is large and varied. This chapter focuses on a small, but influential subset: high-growth startups and their investors. The literature review will focus on young, small business that have some intention to grow or hire employees. A standard defense of focusing on these firms—despite their rarity—argues

that young, innovative firms are drivers of innovation, employment, and economic growth (Akcigit et al., 2022).

## 2 Why race and gender?

A chapter that provides an in-depth review of the theory and empirical results of race and gender in entrepreneurial finance is useful for several reasons. The facts about gender and race are the most common motivation in the papers reviewed (see Table 1). Here, the representation of women and minorities in entrepreneurial firms looks much like the 1970s labor and education markets that formed the basis for a large economics literature. For example, women run less than a quarter of VC-backed startups, while since 1996 whites start new firms at a 23% higher rate than blacks (documented in Section 4 below). Historical issues surrounding discrimination – wealth disparities, education gaps, and cultural norms – also exacerbated the sizeable gaps in participation and funding. All these frictions showing up in the entrepreneurial finance setting result in complicated policy solutions, but given the importance of entrepreneurial firms to economies, the marginal returns to solving the problems are high.

Next, unlike the small one-establishment business with a single founder-employee, most of these firms of interest face financing constraints and must raise outside capital. Such constraints give rise to business relationships with investors such as angels, venture capitalists and private equity firms. Even within a well-functioning entrepreneurial finance market where all players are attempting to maximize firm value, there are inevitably conflicting incentives. For example, the entrepreneur may want to remain in control to benefit from non-pecuniary benefits (Moskowitz and Vissing-Jørgensen, 2002; Ewens and Farre-Mensa (2020)), while venture capitalists want to pursue high-growth for the goal of a large exit. How race and gender interact with this complex environment is still an open question and can provide insight into financial intermediation more broadly. Finally, founding, financing, and growing high-growth startups are each an environment where players have different information sets and beliefs. It is unfortunately an ideal setting for topics around discrimination, stereotypes,

and other issues of discrimination.

Next, there are many reasons to think that the classic model of discrimination in Becker (1957) where markets can temper prejudice, particularly applies to venture capital and private equity. On the one hand, intermediaries receive high-powered incentives to maximize fund returns and, for venture capital, have so few “shots on goal” that bias or discriminatory behavior is costly. In a world without discrimination, race and gender are likely to have no impact on entrepreneurial success. The chapter’s focus on high-growth startups suggests that this prediction is even stronger. The success and failure of these companies hinges on a complex assortment of resource collection, luck, and technical skill. All these facts could lead one to form a strong null hypothesis that prejudice-based discrimination (i.e., taste-based) will be absent in the chapter’s setting.

Despite the aforementioned factors, there are many reasons that discrimination by race or gender may persist. Information asymmetries are quite extreme, particularly when compared to lending settings (banks) or companies with clear, physical assets that can act as collateral for loans and are possibly easier to value. Information asymmetries about types or quality are the starting point for numerous theories of discrimination (see section 5). Next, various investors – angels, individuals, and VCs – decide on “gut feelings” or after personal meetings with entrepreneurs (Hu and Ma, 2021; Gompers et al., 2020). These subjective decisions are ripe for the emergence of bias or stereotypes.

So, beyond discrimination as a topic being important to understand, diagnose and hopefully solve in any setting, I believe that this is particularly important in entrepreneurship and venture capital. Even if a reader is not interested in venture capital or entrepreneurial finance per se, the unique features of the setting may provide insights into the broader fields of discrimination.

### **3 From founding to financing to exit**

I next describe a simplified version of the typical startup path founding decision to eventual exit of an investment by an investor (and return realization for a founder). The goal is to show

that the process' complexity and length can translate into many gender or race disparities that can compound over time: founding choices, financing likelihood, startup growth and eventual startup exits (e.g., IPOs). The setting applies to most U.S.-based startups intending to grow, hire employees, for those that are relatively less intensive regarding physical capital, and pursue innovation. As highlighted by Kerr and Nanda (2011), founders who aim to form these types of firms are much more likely to suffer from financing constraints because they cannot access the traditional debt markets such as banks. Such firms thus need to raise outside equity financing. The complexity of the environment reveals that there are various opportunities for bias or differential treatment to emerge, disadvantaging women and minorities.

### **3.1 Founding decision**

Start first with the founding decision by an individual entrepreneur with a positive net present value project given the required inputs (capital, time, labor, and advice). I simplify this founding decision into two parts. The first is the actions taken prior to the decision that makes the individual confident that – conditional on all the other components falling into place – she can achieve the goal of founding and realizing a return that justifies the risk. Here, we have a situation where a founder may require significant education or work experience. For example, starting a biotech firm requires scientific expertise, while starting an enterprise software venture requires sales expertise. Note that this first stage of analysis relates to topics at the heart of labor economics: occupational choice, human capital investment, compensation, etc. The second step is the choice of firm type, scale, industry, location, and long-term goals. Among many other things, the founder's choices here affect the type and amount of capital required and the team characteristics demanded by the business.

### **3.2 Post-founding: gathering resources and growing the firm**

Now suppose that we have a founder who believes that she has the requisite skills and experience to attempt firm formation. She must now gather resources. This includes finding



co-founders (Wasserman, 2012), hiring early employees (Sorenson et al., 2021), retaining lawyers and accountants, and identifying intellectual property. Much of this requires capital. Absent a pile of personal or family wealth, she must seek outside capital. Enter the financiers.

In our simple setting, this founder’s idea is not well-suited for bank debt because the firm lacks assets that can act as collateral and has no expectations of revenues in the near term. Section 4 details the typical sources of early-stage non-bank finance, but for this exercise, we will assume she must approach individual investors, such as angels, or institutional investors (e.g., VCs). Angel investors typically invest their own money (Kerr et al., 2014), while the latter are sophisticated financial intermediaries with the goal of maximizing returns for their own investors (here, limited partners). Approaching these investors, the founder may encounter a problem: they may have a threshold for firm progress, such as a working prototype or customers (i.e., “Come back when you have some traction.”)<sup>1</sup>. Thus, the founder will require her own equity, sweat equity or an asset such as a home equity that she can borrow against (Kerr et al., 2022).<sup>2</sup> Suppose the founder gathers her own resources to achieve the first required milestone for these investors and successfully raises equity financing. Now she must run a startup.

Among many steps, growing a startup involves hiring, investing in physical or intangible assets, acquiring customers, and continuing to raise capital to finance it all (every 12-18 months for VC-backed startups).<sup>3</sup> Since 2002, the typical startup that raises venture capital raises 2.7 rounds of financing,<sup>4</sup> while conditional on at least one financing, raises \$29m. Thus, the founder must repeat a similar financing step detailed above. Taking outside capital from sophisticated investors also introduces potential conflicts between the founder/firms and the capital provider. Even if available, bank debt demands regular interest payments and loan payback. Outside equity investors have their own return expectations and investment

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<sup>1</sup>See Gompers et al. (2020) for survey evidence on the VC deal and investment process.

<sup>2</sup>The Goldsmith-Pinkham and Shue (2020) finding that women earning lower returns on housing will likely only exacerbate the relationship between home equity and entrepreneurship for women.

<sup>3</sup>Author’s calculation using VentureSource. All follow-on financing events (i.e., not first financing events) of startups with at least one venture capital investor and first financed between 2002 and 2017.

<sup>4</sup>Author’s calculation using VentureSource. All startups backed by venture capitalists first financed between 2002 and 2019.

horizons. For the latter, a venture capital investor invests out of a fund that has a finite investment window (4-5 years) and limited life that generates a demand to liquidate their position (Metrick and Yasuda, 2010). These investors will often demand some control rights (Kaplan and Strömberg, 2003) beyond their equity position. Thus, beyond using her newly raised capital for hiring and investment, the founder must work with her investor’s demands in mind.

### **3.3 Realizing value**

In the last step, the firm and its investors will seek to realize a return by liquidating their position in the fund. This typically occurs through an initial public offering (sell shares to the public) or acquisition (sell shares to another firm).<sup>5</sup> A startup’s final valuation and terms depend on the growth achieved, which depends (in part) on how much money it has raised. How could gender or race matter at this stage (all else equal)? The exit decision is a joint decision of the board of directors, which is commonly controlled by the investors in the later stages of the startup’s life (Ewens and Malenko, 2022). Negotiation is thus between the founder and board members, on the one hand, and between the firm and the acquirer or institutional investors and underwriters (in an IPO offering), on the other hand.

### **3.4 Guiding our analysis**

This simplified story of the high-growth startup reveals the steps where discrimination, bias, nepotism, stereotypes, and differential treatment can affect observed choices or outcomes:

1. Founding decision, pre-capital raising
2. Resource gathering (e.g., financial and human capital)
3. Growing the firm with active investors
4. Exiting the firm

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<sup>5</sup>For benchmark exit rates, see Ewens and Farre-Mensa (2020).

The theories of these behaviors and preferences will play a different role in each step. The setting clarifies that any analysis of one stage—e.g., the differences in racial representation in CEO founders at IPO—is a function of a potentially extensive set of decisions. Researchers must account for these facts when planning their analyses, while policymakers with limited resources should target solutions that address the sources of underlying differences.

## 4 Facts about founders, startups, and investors

This section sets the stage for the economic framework and literature review by presenting some fundamental facts about entrepreneurs, capital providers and outcomes related to race and gender. It is a preview of the deeper literature review of recent research that explicitly tests for discrimination or bias. Table 1 below summarizes the major facts about gender and race representation.

Of course, any numbers presented here that show differential outcomes by race and gender do not address whether discriminatory actions or biased preferences exist. Nonetheless, univariate statistics can be informative on their own. This is not the first survey to document the participation of women and minorities in startups. The Diana Project’s<sup>6</sup> researchers provided the first comprehensive analysis of female-founded firms raising venture capital.<sup>7</sup> In a series of reports (Brush et al. 2001, 2004, 2008), the researchers documented a persistent 30-year under-representation by female-founded firms in terms of angel and venture capital.

The table presents five settings: the founding decision, the firm formation choice (e.g., industry and size), raising capital, investor characteristics and outcomes. It aims to report statistics as of 2020–2021, but many are older. The main statistics of interest will include participation or basic firm characteristics by gender and race, where the unit of observation is typically the startup. Here, female- or Black-founded means that the startup had at least one woman or Black founder. Note that many cells are blank because I could not find reliable data sources for the statistics. These gaps provide directions for future data collection and

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<sup>6</sup>See <https://www.dianaproject.org>.

<sup>7</sup>For an earlier review of female-founded firms, see Brush (1992).

research. The focus here on Black entrepreneurs rather than other minorities such as Latinos (a larger proportion of the U.S. population) is worth mention. As with the overall focus on gender, this is because the data is limited on other ethnicities and unfortunately there are too few papers with these samples.

Table 1 focuses on the across-gender or across-race comparison for benchmarking. This approach works well in the context of U.S. population shares: 50% women, 13.4% Black and 18.5% Latino (Census, 2019 Population Estimates Program).<sup>8</sup> Another useful benchmark is the labor force participation rates in 2020: 56.2% for women (similar across races), 67.7% for white men, 62.6% for Black men and 75% for Hispanic men. Gompers and Wang (2017b) provide other useful benchmarks that condition on education and career choices (Figures 1 and 3). For example, women earn over 57% of bachelor's degrees since 2010 and half of all lawyers are women. Thus, we can compare the low rates of Black entrepreneurship in Table 1 to Black representation in awarded bachelor's degrees (9%) and doctors or lawyers (approximately 5%) since 2010.

#### **4.1 Founding decision: when, how, and with whom**

Panel A of Table 1 provides statistics about the differences in entrepreneurial entry by gender and race. Across multiple time periods and geographies, the pattern is apparent: women and Blacks are significantly less likely than men and whites to form new firms. For example, Fairlie and Desai (2021) use the monthly Current Population Survey to show that men started new business at a 64% higher rate than women from 2019 to 2020 (Table 2), while from 1996 to 2020 blacks started new businesses at a 22% lower rate than whites. The new business formation data encompasses an enormous set of companies that are not the focus of this chapter (e.g., non-employers or non-incorporated), however, the gender and racial gap is large and persistent. The share of female founders from the NSLY (28%), Survey of Small Business Owners (29.9%) and newly incorporated CA/MA firms (22%) are each significantly below any population, education, or occupation benchmarks. This gap

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<sup>8</sup>See <https://www.census.gov/quickfacts/fact/table/US/RHI725219>.

motivates both this chapter, and the literature summarized in Section 6. Next, the row “Team size / employment at start” asks whether female-founded firms look different from their male-founded counterparts at founding. Data from AngelList and French incorporation databases show that founding team size and number of employees at startup are significantly smaller in startups founded by at least one woman.

The next part of Panel A considers the subset of high-growth startups. There are multiple ways to define such firms, such as sales growth and incorporation type. The participation rate of women is almost uniformly lower than the baseline entrepreneurial entry. For example, Guzman and Kacperczyk (2019) find only 17% of high-growth startups are founded by women, while Sohl (2020) survey and Ewens and Townsend (2020) data from AngelList show 16-28% participation among angel-backed startups. Other than the Sohl (2020) survey showing 19.4% of angel-backed startups were founded by minorities, there is little data on Black or minority founder participation for these types of firms. According to the 2021 Census population estimate, this 19.4% is below the 25% non-White share of the population.

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## 4.2 Raising capital: sources and amounts

The facts above show that even before institutional capital is raised, the representation of women and most minorities falls significantly below their population and labor force participation. In this section, we consider the set of founders that have entered entrepreneurship and have raised some capital.

Started in 2004 and run through 2011, the Kauffman Firm Survey (KFS) is a longitudinal survey of new U.S. businesses. As detailed by Coleman and Robb (2009), the survey collects information about the owners and business related to physical location, industry, employment, profits, intellectual property, and financing at founding and beyond. A major advantage of such data is the ability to avoid survivorship bias inherent in any database that conditions on firm financing. The data allows Coleman and Robb to look within-industry

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<sup>9</sup>See <https://www.census.gov/quickfacts/fact/table/US/PST045221>.

at-founding financing choice, limiting concerns about industry sorting by founders. The authors document that women-owned new businesses start with relatively less capital, raise less debt and equity post-founding and are more likely to rely on personal sources of finance than male-owned firms (studies with similar patterns include Fairlie and Robb (2009a) and Constantinidis et al., 2006). Fairlie et al. (2022) use later waves of the KFS to explore capital access issues at firm formation and follow firms as they grow. Black-founded firms raise less initial capital of all types, but primarily external debt. Panel B of Table 1 reports that black-owned business in the KFS are 50% less likely to use small business bank finance than other startups.

The next two rows of Panel B show that women and minorities are underrepresented among VC-backed startups in 2020: 14.5% for women, and 2.4% for Hispanics and Black. Gompers and Wang (2017b) present a study of the time series of VC-backed startups. The headline numbers are clear: women run 10% of VC-backed startups since 1990 (as of 2015), while black founders run only 2% of firms.<sup>10</sup> They find that although these groups have increased their participation in education or career paths historically found in founder or VC investor resumes, their participation in startups lags. For example, the female participation rate in the financial industry is three to four times higher than that found in VC-backed startups (e.g., since 2010, 34% of investment bankers were women, compared to 9% of venture capitalists). This ability to benchmark racial and gender participation among financed firms using bachelor's degree rates, professional jobs and post-graduate degrees is a powerful means of assessing the sources of disparities. Ideally, researchers can continue to build individual-level data that can control for these factors at the founder-level.

The rest of Table 1 Panel B paints the same picture as these initial statistics. Women represent 10% of high-growth startups that raise VC in CA or MA, 10% of Form D filers raising multiple types of private equity, 21-24% of angel capital and 34.6% of small business capital in the KFS survey. These disparities only disappear in the relatively newer financing

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<sup>10</sup>Using a sample of VC-backed startups from 2011–2013 provided by Pitchbook, Brush et al. (2018) find that the percentage of firms with a female executive increased from 9% to 18%. The authors found that these management teams raise less capital (even within the same industry).

environment of crowdfunding. Both reward-based and equity-based crowdfunding (details in Section 7) show negligible differences in capital raising by gender. This equality suggests increased investor participation can help shrink the entrepreneurship gender gap.

### 4.3 Investors

Often labeled as “gate-keepers,” venture capitalists—and to a lesser extent angel investors—have the power to determine the small set of startups that receive external equity financing (Puri and Zarutskie, 2012). Where preferences or bias for entrepreneurs among investors persist (i.e., each gender prefers to invest in its own gender), one solution to the founding and financing gaps is increased participation by women and minorities on the supply side of the market. Panel C of Table 1 suggests that there is still a long way to go on this front. Some 26-30% of angel investors and 16% of general partners at VC firms are women.<sup>11</sup> Blacks make up 4% of the latter. The main decision-makers in private equity are the individuals that control the funds that invest in startups (e.g., managing directors). Here, the gap widens. A little over 5% of VC funds in 2020 are women-managed, while 3.8% of PE funds (VC, growth equity, etc.) from 2011 to 2016 were run by minorities. Section 7.3 discusses market and government programs aimed at closing the supply side gender and racial gaps.

### 4.4 Outcomes

Consider now the set of financed or founded startups and take as given the distribution of gender or race in these firms. We next ask how outcomes differ by these characteristics. Such an analysis is, of course, limited by the facts described above: firms founded by women or minorities are different at founding (e.g., smaller, lower growth industries, less startup capital, etc.). We thus will present simple summary statistics that do not account for these differences and then highlight work that attempts to control for such factors.

One of the most comprehensive studies of differences in entrepreneurial success by race

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<sup>11</sup>There are other decision-makers at VC firms such as managing directors who could also impact the gender or racial composition of the portfolio.

is Fairlie and Robb (2009b)’s study of small businesses in the Census data. For the set of businesses founded between 1992, they find that compared to white-owned firms, black-owned firms are 54% less likely to have at least \$10,000 in profits and fail at a 20% higher rate. Panel D of Table 1 presents additional statistics on outcome differences by gender. Some 1-3% of new IPOs have a female CEO since 1996, while female-founded VC-backed startups successfully exit at rates above their participation rates (19.4% exit rate vs. 14.5%). The latter fact suggests that any discriminatory behavior resulting in lower founding or funding rates for women cannot be easily justified by differences in expected outcomes. This news is mixed when we consider the set of CA or MA-incorporated firms, where the 7% exit rate is below participation. Similarly, female-founded VC-backed startups’ exits account for only 8.7% of total value and angel-backed startups have a 42% lower success rate than male-founded firms (Ewens and Townsend, 2020).

## 4.5 Putting it all together

Table 1 paints a clear picture of the entrepreneurship gap in terms of both race and gender. Women and Blacks are underrepresented at all stages of the entrepreneurial process regardless of the benchmark used (i.e., population, labor force participation, etc.). It presents a snapshot in time that when compared to statistics from early versions of the same sources, has weakly improved over the last decade. However, the rates of convergence suggest that it will take at least another three decades to reach equality (e.g., 3.45% per year growth in VC dollars to female-founded startups). Finally, there are also major data gaps in Table 1 for participation and outcomes by race. While these data gaps are slowly being addressed by investors and data providers (Section 7.3), a more systematic approach by academics or policy makers is warranted.



## 5 Economics of discrimination

This section presents a short primer on the economics of discrimination. The aim here is to provide the minimum background on the area for researchers in entrepreneurial finance or private equity who want to explore topics of race or gender. It also provides guidance for data collection steps and the host of alternative explanations that emerge in discrimination analysis.

This section does not provide the full review of the literature, which can be found Cain (1986) (labor market; wages and income), Altonji and Blank (1999) (labor market; theory and empirical), Ross and Yinger (2002) (consumer lending), Blank et al. (2004) (measurement and detection), Fryer Jr (2011) (race and education), Charles and Guryan (2011) (literature review), Bertrand and Duflo (2017) (field experiments), Neumark (2018) (experiments in labor market) and Small and Pager (2020) (sociology). For a complete listing of economic research published in the top ten economics journals, see the appendix file of Bohren et al. (2019b).

### 5.1 Definitions and terms

Before summarizing the major economic theories of discrimination, it is useful to set terms and definitions.

#### Prejudice

Becker (1957) treats prejudice as a distaste for or aversion to cross-racial contact or interactions. The Latin *praejudicium* is “a preliminary hearing or presumption” and related to *praejudicio* “to prejudge” (Schneider, 2005). In the context of the discrimination and bias literature, this always has a negative connotation, but of course, prejudice can be positive. Schneider (2005) defines prejudice as “the set of affective reactions we have toward people as a function of their category memberships.” (page 27)

## Discrimination

“Discrimination” is used in a variety of ways, depending on the speaker (economist versus sociologist) and setting (legal or academic). The definition used in the chapter is sometimes labeled “canonical” discrimination or taste-based discrimination. As Becker (1957) highlights, psychology has the first word on its definition, defining discrimination as when an individual’s behavior towards another is not tied to “objective” fact.<sup>12</sup> However, such a definition is limiting because such actions can be both positive or negative. Instead, Becker proposes to let an individual’s actions in the market provide the definition:

If an individual has a “taste for discrimination”, he must act as if he will pay for something either directly or as reduced income, to be associated with some persons instead of others. (page 12)

This definition clarifies that discrimination is an act. Within economics, this act involves a market transaction.<sup>13</sup> As we will see, there is a role for beliefs in the study of discrimination and differential outcomes by category, but the primary discrimination definition stems primarily from preference.

The bulk of research on discrimination sits broadly in labor economics. The extensive review of this literature in Altonji and Blank (1999) defines labor market discrimination as “a situation in which persons who provide labor market services and who are equally productive in a physical or material sense are treated unequally in a way that is related to an observable characteristic such as race, ethnicity or gender.” (page 3168). Here, “unequal” is different wages or demand for labor. Finally, the Heckman (1998) definition provides some guidance for empirical tests:

At the level of a potential worker or credit applicant dealing with a firm, racial discrimination is said to arise if an otherwise identical person is treated differently by virtue of that person’s race or gender, and race and gender by themselves have

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<sup>12</sup>A similar definition for discrimination is found in Schneider (2005): “Unjustified use of category information to make judgements about other people” (page 29).

<sup>13</sup>Neptotism is a close cousin to discrimination.

no direct effect on productivity. Discrimination is a causal effect defined by a hypothetical *ceteris paribus* conceptual experiment—varying race but keeping all else constant. (page 102)

We will discuss types of discrimination below.

## **Stereotypes**

As the review of the entrepreneurial finance literature below demonstrate, the concept of stereotypes emerges in many settings where an outside capital provider evaluates an entrepreneurial investment opportunity. The earlier theoretical literature on discrimination Beck et al. (2010), Phelps (1972), Arrow (1973), and (Aigner and Cain, 1977) assumed employers, landlords, etc. held and acted upon rational beliefs. Incorporating incorrect beliefs or stereotypes can impact how one tests for discrimination and constructs research designs.

As shown by Schneider (2005), pinning down a definition of stereotypes is difficult.<sup>14</sup> He offers a simple starting point: “stereotypes are qualities perceived to be associated with particular groups or categories of people” (page 24). The economics literature has settled on defining stereotypes as “biased beliefs” (Hull, 2021) and “miscalibrated beliefs” (Egan et al., 2022). Bordalo et al. (2016) present a model where stereotypes emerge when:

“A decision maker assesses a target group by over- weighting its representative types, defined as the types that occur more frequently in that group than in a baseline reference group. Stereotypes formed this way contain a ‘kernel of truth’: they are rooted in true differences between groups.” (page 1753)

A key feature of their model is that stereotypes are “context dependent” where an agent’s assessment of an individual’s target group depends on the chosen reference group.

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<sup>14</sup>Simply see the documented history of definitions (pages 16-17).

## Homophily

In its simplest form, homophily is strong “relationship between association and similarity.” (McPherson et al., 2001). A common primary source for the concept of homophily is Lazarsfeld et al. (1954), who present two types. Status homophily is connected to formal or informal status, such as race and gender and value homophily, which is based on beliefs and values. Nearly all the tests or discussions of homophily in the literature reviewed below focus on status homophily.<sup>15</sup>

### 5.2 Framework

Detecting discrimination often reduces to an evaluation of an estimated regression coefficient. Therefore, consider a simple linear model connecting outcomes of interest in this chapter – e.g., firm founding, capital raising, revenues or success – to firm and founder characteristics. The model provides a way to define discrimination.<sup>16</sup> Let the outcome of interest be financing amount  $Y$ :

$$Y = \gamma X + \beta Z + \epsilon \quad (1)$$

The vector  $X$  contains the characteristics that predict financing amount (e.g., investment opportunities, industry, profitability, etc.) and  $Z$  is a zero-one variable for gender, race, or ethnicity. If  $X$  contains all the variables that the researcher believes matter for financing outcomes and it is exogenous and  $Z$  is uncorrelated with  $\epsilon$ , then  $\hat{\beta} < 0$  reveals discrimination. Of course, any observational data from interesting economic environments used to estimate (1) rarely satisfy these conditions. The standard arguments about confounding omitted variables and sample selection when discussion estimates of (1) can be tied to the theories of discrimination below. For example, real-world data rarely includes all observables that correlation with outcome  $Y$  and those omitted could correlate with gender  $Z$  (e.g., risk preferences). It is possible that  $Z$  matters for financing or firm success (e.g., a firm performs

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<sup>15</sup>One interesting area of study related to value homophily relates to the matching of investors and founders by risk tolerance or partisanship.

<sup>16</sup>Some of this structure is inspired by David Autor’s lecture notes (<https://economics.mit.edu/faculty/dautor/courses>) and the framework in Ewens et al. (2014).

better when a woman is in charge) but it simple captures the omitted variables. Finally, elements of  $X$  are endogenous: minorities face discrimination before raising capital and thus have different levels of  $X$ .

This final explanation is highlighted by Altonji and Blank (1999). They stress the distinction between the typical focus of empirical research – “current [...] market discrimination” – takes as given observed characteristics of entrepreneurs, often ignoring the effects of those characteristics on market outcomes (“pre-market [...] discrimination”, page 3169). For example, discriminatory behavior affects human capital investment in an entrepreneur’s early life and results in different observables when researchers study the market outcomes.

The omitted variable concern notwithstanding, a literature has used (1) regressed by group to direct tests of discrimination. The major example of this is the Oaxaca-Blinder decomposition (Blinder, 1973; Oaxaca, 1973; Oaxaca and Ransom, 1994).<sup>17</sup> The basic intuition is that the in-group (e.g., whites or men) observed outcomes, such as wages can provide a benchmark relationship between observables and outcomes. Assuming the regression model is not missing relevant unobserved predictors (rarely), then one can estimate the role of observable differences (e.g., education, location, experience, etc.) separately from the discrimination component in the cross-section of outcomes. Importantly, these methods provide bounds given the limited control variables available in many settings.

The next sections discuss the various models of differential treatment. Each section also summarizes how the typical research question in entrepreneurial finance could approach empirical tests of discrimination.

### 5.3 Taste-based discrimination

The traditional definition of discrimination presented in 5.1 is a close approximation to our first model of discrimination. Taste-based discrimination assumes that the decision-maker has a taste or disutility from hiring or investing in a certain group. This distaste for the out-group leads to a conscious decision to either not hire, pay lower wages, invest less capital,

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<sup>17</sup>See Jann (2008) for a Stata package of these decompositions that is careful about statistical inference.

or demand more equity. This last feature of the model leads to common empirical tests. Agents acting in ways consistent with taste discrimination should sacrifice profits or returns (in partial equilibrium). The model predicts that for workers with the same observable characteristics, black or female workers will receive lower wages and be hired less often. A challenge (Arrow, 1973) with these two predictions is market equilibrium (though there is debate, see Charles and Guryan, 2008).

### **Tests and data for entrepreneurial finance**

As we will see with the alternative models of discrimination and clear from (1), a simple difference in financing success (hiring) or outcomes (wages) is not enough to prove the existence of taste-based discrimination. One indirect way to rule it out is to study outcomes tied to financial performance. Suppose that investors prefer founders of the same gender because of a distaste for the opposite sex. Their willingness to pay for this disutility should manifest itself in worse outcomes (e.g., exit rates) when they invest in the same gender. Some examples of these tests include Fisman et al. (2017) study of lending in India and Ewens and Townsend (2020) analysis startup exit rates by investor gender. An important requirement here is identifying the gender of both sides of a relationship (e.g., investor-founder or employer-worker).

## **5.4 Statistical discrimination with correct beliefs**

Statistical discrimination (Phelps, 1972; Arrow, 1973; Aigner and Cain, 1977) posits that differential treatment by race or gender can emerge without a distaste by an individual.<sup>18</sup> One need only incorporate a combination of imperfect information and a (correct) correlation between characteristics (race, gender) and outcomes. One can view agents acting in ways consistent with this form of discrimination as a type of signal extraction problem. Indeed, Aigner and Cain (1977) present a model where a group characteristic not only signals productivity, but the variance of the signal difference by group status (this matters

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<sup>18</sup>See Fang and Moro (2011) for a thorough review of the theoretical literature on statistical discrimination

because of employer risk aversion). The Phelps (1972) and Arrow (1973) approaches work off the assumption that group status predicts quality and groups (in-truth) differ in average qualities.

Many researchers attempt to separate taste vs. statistical discrimination explanations for their results.<sup>19</sup> This separation is challenging because models of statistical discrimination concern unobservable expectations and information sets. Not only that, but tests of statistical discrimination also need to account for the issues in discussed in Heckman and Siegelman (1993): when groups (gender or race) have the same expected quality, differences in the variance of those qualities can lead to spurious conclusions about the existence of discrimination.<sup>20</sup> Some examples of papers that have some success separating the two theories include Marx (2022), Mobius and Rosenblat (2006), Oreopoulos (2011), Ewens and Townsend (2020) and the papers highlights in the Guryan and Charles (2013) review. In sum, researchers must approach any “tests for statistical discrimination” carefully because the model incorporates several critical assumptions.

## **Tests and data for entrepreneurial finance**

Viewing statistical discrimination as signal extraction problem suggests it will be a major source of differential treatment in entrepreneurial finance settings. Investors face extreme levels of information asymmetry at the financing decision and after. Thus, many researchers explore heterogeneity in information or experience to separate taste versus statistical explanations. At the heart of most tests is some variation on information levels, information quality, or experience. For example, investors with more experience investing in women should have better assessments of their relative quality (absent taste-based explanations). Similarly, financial settings where entrepreneurs provide rich information or have repeated interactions of investors should exhibit different (smaller) gaps in outcomes by gender or race. Each of these cases have variation in the cross-section or over time in the amount of

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<sup>19</sup>For a skeptical view of the possibility of such separation, see Neumark and Rich (2019).

<sup>20</sup>Neumark (2012) provides a test and method to extract discrimination in this setting following the framework.

information asymmetry and thus a predicted difference in value of the race or gender signal on their own.

## 5.5 Statistical discrimination with incorrect beliefs

If testing for taste versus statistical discrimination was not difficult enough, suppose that the expectations or beliefs about group quality were incorrect or biased. Inaccurate beliefs throw a wrench into standard approaches to detecting discrimination. Bohren et al. (2019a) describe two sources of such inaccurate beliefs and document the resulting identification challenge. One framework generates such beliefs in dynamic learning settings (Bohren et al., 2019b), from heuristics (Fiske, 1998)), or the representativeness heuristic (Bordalo et al., 2016). Incomplete information, particularly about the data-generating process that produces information available to an employer or evaluator, can also generate inaccurate beliefs. This collection of research appears to have moved the expanded the default specification for tests of discrimination to at least allow for the possibility of incorrect or biased beliefs.

### Tests and data for entrepreneurial finance

As shown by Bohren et al. (2019a), incorporating inaccurate beliefs results in a major identification problem, limiting one’s ability to test for taste versus statistical discrimination separately. Statistical discrimination with inaccurate beliefs can often confound results. All hope is not lost, but the bar is much higher if one wants to rule out this type of statistical discrimination. Bohren et al. (2019b) show that along with collecting the standard decisions made by investors (e.g., finance or not) and information available to investors (e.g., industry, capital demand, etc.) one must first “collect data on the subjective beliefs of evaluators” (page 5).<sup>21</sup> For example, a survey (Stanley, 2022) of investors commonly found in private equity funds shows that while they aim to invest in underrepresented money managers, the investors believe this comes at a financial performance cost. The more difficult step requires the researcher collect “data on the true outcome distributions [...] required to determine

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<sup>21</sup>Hull (2021) presents a set of tests that allow for inaccurate and accurate statistical discrimination, while having the ability to rule out canonical taste-based discrimination.



whether beliefs are accurate” (page 5). Ideally, this outcome data would be sourced from outside the researcher’s own sample.

Hu and Ma (2021) are one of the first to take this path in entrepreneurial finance. Researchers interested in separating the three types of discrimination in this area may have to incorporate surveys into their research design and find a representative sample of entrepreneurial outcomes. Perhaps the literature should coalesce around a set of outcome distributions for researchers to use in discrimination studies. If these challenges are not overcome, the researcher must at least be careful to interpret results with the likely inaccurate beliefs confound as an explanation.

## **5.6 Other models of differential treatment**

These three types of discrimination exhaust the explanations addressed in the literature reviewed in the next section. These models each represent a form of direct discrimination. Three alternative, non-direct perspectives are worthy of discussion as the literature develops. The first is implicit discrimination, summarized in Bertrand et al. (2005). This type of discrimination is subconscious and supported by evidence from the social psychology literature. The authors propose the use of the Implicit Association Test (IAT) (Greenwald et al., 1998) either before a research design is implemented or on a subset of subjects in one’s observational data study.

Most economists and their discrimination models assume deliberate actions. Small and Pager (2020) highlight the role institutional racism: “something other than individuals may discriminate by race” or “differential treatment by race that is either perpetuated by organizations or codified into law.” (page 52) Organizations – firms, governments, etc. – can discriminate even if individual agents have no such preference. For example, layoff rules based on seniority in firms or organizations where discrimination historically limited upward mobility of women and minorities can generate differential treatment without taste or statistical motivations. Similarly, hiring based on referrals in a world with homophily in network

formation may weaken diversity.<sup>22</sup>

The third framework—systemic discrimination—considers the cumulative impact of direct and indirect discrimination. Bohren et al. (2022) summarize the fundamental feature of this approach: any analysis of direct discrimination that simply conditions on characteristics like wealth, education, or income fails to incorporate discrimination’s role in any disparities in these non-race or non-gender characteristics. For example, many settings involve unbiased decision-makers who use these observable characteristics in their decisions while being unaware that the characteristics’ correlate with group characteristics. This information gap can lead researchers to incorrectly conclude there is direct discrimination, when systemic is at play. Bohren et al. (2022) presents a measurement solution for systemic discrimination that uses a combination of observables and random variation of race or gender to separate the direct from the systemic.

Last, the framework of equation (1) and the empirical tests reviewed below each assume a clean, unambiguous signal of race or gender. Race is, however, not a simple binary variable because it is not a biological fact. The “constructivist” perspective from the sociological literature complicates traditional empirical tests of discrimination. Rose (2022) summarizes this:

The constructivist argues that race exists not as a natural, but as a social category forged over hundreds of years of political and historical processes. As a result, while individuals may observe others’ physical traits, they interpret race; race in data and economic models therefore reflects both physical facts about people and the potentially non-neutral mental models people use to digest those facts.  
(page 2)

Rose (2022) reviews tests for discrimination—both taste and statistical – with this alternative perspective of race and presents modifications to methods (instruments) or assumptions (i.e., which observable factors matter for decisions) that can incorporate a constructivist view.

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<sup>22</sup>Less relevant for our setting are Legal frameworks that often result in disparities by race or gender and have long-lasting impacts (e.g., redlining in real estate markets).

This sociology-motivated approach is likely to grow in importance along with the others detailed above.

### **Tests and data for entrepreneurial finance**

These alternative explanations for differential treatment by race and gender pose challenges for entrepreneurial finance researchers. The explanations tied to organizational issues such as referral networks or firing rules as most likely to apply to how venture capital firms are managed (less so for startups given their age). Research discussed in Section 6 shows that diversity is an issue for modern private equity investors and gender (and likely racial) composition matters for investment strategy. Some work has been done on how VC firms are organized or (Gompers and Lerner, 1999; Ivashina and Lerner, 2019; Malenko et al., 2021), but it is not known what role they play in the gender or racial gaps. Last, data on private startups rarely has clean variables for race, while investors have limited interactions with founders during fundraising. The constructivist perspective of racial identity suggests that incorporating racial perceptions into discrimination analyses will be fruitful in entrepreneurship research.

## **6 Race and gender patterns: review of the literature**

I now summarize the literature on the role of gender and race in entrepreneurial finance, covering topics from economics, labor, finance, and entrepreneurship. This section follows the frameworks presented in Section 3: founding the firm, gathering resources (what and from whom) and outcomes. Each section will look back on the theories discussed above. There are settings or choices where individuals must bring their own resources – both financial and human – and others where they must interact with outsiders (e.g., investors or the public). In the latter situation, we can consider the information and beliefs frameworks. Finally, each subsection summarizes the major lessons from the literature and important next steps in terms of unanswered questions or missing data.

## 6.1 Resources

Several steps must be completed before an entrepreneur founds a firm and raises capital. Starting a firm often requires personal capital before founding (Robb and Robinson, 2014). An extensive literature explores the connection between an individual’s wealth and entrepreneurial entry. Indeed, the facts about startup capital discussed in Section 4 suggest that personal, pre-founding resources of the founder matter for the decision. Evans and Jovanovic (1989) conclude that liquidity or financing constraints bind, and an individual’s wealth has predictive power for entrepreneurship. Bradford (2003) documents wealth accumulation differences between black and white entrepreneurs, finding that the former hold a lower fraction of family wealth. Derenoncourt et al. (2022)’s 160-year panel shows this wealth disparity has been a persistent feature of the economy with unclear paths for convergence in the medium term. On top of these wealth disparities, Levine and Rubinstein (2017) show that income and household structure matters as well: entrepreneurs (self-employed in incorporated firms) tend to come from high-income, two-parent households.

Hurst and Lusardi (2004) push back against claims that wealth is a major predictor of entrepreneurship. Rather, they find that the relationship between the two is flat, except in the right tail of the wealth distribution. Kerr and Nanda (2011) address the mixed evidence on the role of wealth and entrepreneurship by highlighting the heterogeneity of startups—high-growth and innovative versus small business—and how this interacts with capital demand. One stream of research supporting a role for studies home equity valuation (i.e., collateral) and entrepreneurship (see Fairlie and Krashinsky, 2012; Corradin and Popov, 2015; Harding and Rosenthal, 2017; Schmalz et al., 2017).<sup>23</sup> Indeed, the 2007 Survey of Business Owners (SBO) shows that home equity supported the initial funding of 12% of employer-businesses in the U.S. (Kerr et al., 2022) bring rich Census data to the question to discover that many of the users of home equity for startup capital are confined to less productive, lower educated founders. Although they conclude that changes in home equity cannot explain increases in entrepreneurship, their results and others illustrate that personal savings and collateral are

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<sup>23</sup>Also see Bellon et al. (2021) who study the effect of wealth shocks and business formation.

key resources for entrepreneurs.

Some parts of a founder’s human capital depend on unequal distribution of wealth and information in the economy. We find one example in the Fairlie and Robb (2007a) analysis of small business performance. They find striking differences in sales, profits, employment, and closures between white and black-owned business. The missing pieces that help explain these differences are lower work experience in family businesses and business in their startup industries. This result shows that disparities beyond wealth or collateral could generate differences in race or gender in high-growth firms.

**Lessons and next steps.** The racial and gender disparities in resources necessary to become a high-growth entrepreneur are unlikely to dissipate in the short-run. Thus, researchers using observational data to understand the role of race and gender should continue to incorporate these facts into their modeling and interpretation of results. In its simplest form, coefficient estimates are affected by a host of economically important omitted variables. As with any other empirical analysis, the solution is not inclusion of imperfect proxies for antecedents to entrepreneurship. These proxies could be related to discrimination, “caus[ing] the unexplained differences to understate the role that discrimination” in the gap in outcomes.<sup>24</sup> Instead, the proxies related to founder backgrounds and resources should be improved with a renewed focus on building deep rather than broad samples of entrepreneurs.

## 6.2 Entry and founding

This section of the chapter is extensive. There are several reasons for this attention to the supply-side of entrepreneurial outcomes. First, recall the facts documented in Section 4: the set of new firms—before raising capital—have low participation rates by women and most minorities. Any analysis of differences in financings, growth and outcomes by gender or race must benchmark using the entry rates. Similarly, these antecedents should inform empirical or theoretical analysis in terms of control variables or economic mechanisms. For example, because childhood social networks play an important role in labor market decisions, any anal-

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<sup>24</sup>(Guryan and Charles, 2013, , pp F419).

ysis will have a likely unobserved confound. We may be unable to control for these founder or investor characteristics, however, understanding its scope will help us assess coefficient bias through standard omitted variable arguments. Third, some theories of discrimination incorporate beliefs about type and its correlation with race or gender. The academic literature provides us a starting point for correct beliefs about these objects. Finally, although much of the surveyed literature focuses on entrepreneurial choice, the frictions and predictors are generally about labor market choices. They thus also affect the entry and characteristics of bank loan officers, angel investors, venture capitalists and crowdfunding participants.

### **6.2.1 Career goals and flexibility**

Workers evaluate the choice of becoming an entrepreneur much like they evaluate becoming a doctor, botanist, or surf instructor. One important factor is compensation and its relationship to hours worked. Running an entrepreneurial firm is appealing to many because of the non-pecuniary benefits (e.g., Moskowitz and Vissing-Jørgensen, 2002), which includes the ability to set one’s hours, schedule, and task list. High-growth entrepreneurial firms in innovative sectors are likely at the extreme of hours required and flexibility demands on their founding team.<sup>25</sup> Where running these firms affords more flexibility, compensation or hours required than alternative career options, there is scope for different choices by gender (less so for race). Goldin (2014) analysis of the changing gender wage gap provides critical insights for female entrepreneurs.

Goldin first documents that the while the gender wage and income gap has shrunk over the last 40 years, sizeable gaps remain. Those gaps are prominent in high-paying occupations, which are the industries and professions where women have made some of the largest gains in experience and education. Next, she finds that those industries with persistently large gaps in “business” (examples include “Chief executive and legislator”, “Financial manager”,

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<sup>25</sup>The chapter’s focus on high-growth entrepreneurial firms that intend to hire employees implies that we do not discuss the forms of entrepreneurship (e.g., self-employment) that may be more valuable for individuals requiring flexibility. See Parker (2018, Section 8.2.2) for a discussion of this topic.

“Economist” and “Accountant and auditor”)<sup>26</sup> Goldin argues the variation in the gender gap can partially be explained by occupations’ differences in “job flexibility.” For example, occupations that require not just many hours worked, but the specific block of hours worked: some jobs require 70 hours a week, but only some that do must pay twice the pay of the 35-hour position. These non-linear earnings profiles could cause differential pay by gender if demands for flexibility are different. The model presented in the paper has direct implications for entrepreneurs, as it rests on imperfect substitutability between workers. As Goldin writes, the entrepreneur “cannot fully delegate responsibility.” (page 1104). The facts and theory presented in Goldin (2014) are central to our understanding of the initial gender gap in entrepreneurship.<sup>27</sup>

Entrepreneurial ventures require significant time, and those pursuing high-growth strategies have high failure rates. The decision to become a full-time entrepreneur requires leaving wage employment. Researchers have shown (Mincer and Ofek, 1982; Light and Ureta, 1995; Albrecht et al., 1999) that interruptions to waged careers result in lower earning when workers return. Gottlieb et al. study whether improvements in job protections around parental leave encouraged more entrepreneurship. The results show that the risk of lower pay to experiment with entrepreneurship could inhibit entry. The paper’s setting of mother parental leave highlights one channel through which this career risk could disproportionately affect aspiring female entrepreneurs. Other legal institutions can inhibit entry by underrepresented groups or increase the risk of failing after founding. For example, Marx (2021) finds that legal risks around non-compete rules disproportionately discourage entry by female entrepreneurs and results lower use of their professional networks when seeking talent.

### 6.2.2 Family concerns

Issues surrounding family and motherhood could be connected to preferences for hours’ flexibility. I discuss two recent papers in this literature, which are part of a larger literature

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<sup>26</sup>See the online appendix with the full breakdown here: <https://www.aeaweb.org/articles?id=10.1257/aer.104.4.1091>.

<sup>27</sup>Also see Lombard (2001) for an estimation of the tradeoff between flexible work hours and self-employment.

extensively summarized in Parker (2018). Researchers have explored correlations between job protections, childcare, and healthcare provision (e.g., Thébaud, 2015) and entrepreneurship, however, few have found causal links. Zandberg (2019) asks whether access to reproductive care and control over the time of having a child affects women’s choice to become an entrepreneur. He finds that access to abortion correlates with female entrepreneurship and isolates a causal channel using law changes that impacted access. The results demonstrate that part of the gender participation gap could be explained by family considerations that disproportionately impact women. Core (2020) investigates similar questions using Italian data and finds similar results. The effects of lower maternity risk are largest for innovative entrepreneurs.

### **6.2.3 Early-life experiences**

What role do early-life experiences play in explaining the gap in entrepreneurial entry between men and women and whites and blacks? Consider first the choice to patent or innovate, a feature of many high-growth startups. Many entrepreneurial firms pursue innovative business ideas and patent. Thus, the pool of innovators and inventors provides a useful benchmark for an important subset of entrepreneurs. Bell et al. (2019) use linked tax records and patented inventions to separate the role of ability and environment in the choices to become an inventor. Several important facts emerge that inform the entrepreneurship and private equity literature. Race, gender, and wealth all strongly predict a child’s probability of inventing. The gap by race and gender does not disappear after controlling for early childhood math test scores, demonstrating that environment drives innovative choices. Girls’ eventual choice of specific patent industry depends on whether they grew up in an area where women inventing in the same innovative area. This shows that role-model and social networks can explain much of the differences in patenting choices.

Most researchers are not fortunate enough to have data on the full history of entrepreneurs or investors. Instead, they often have databases of existing (rather than potential) startups or those that have raised outside capital. When combined with work on inter-generational



predictors of entrepreneurship (e.g., Lindquist et al., 2015), Bell et al. (2019) show that researchers in entrepreneurship and PE must incorporate the complex – and often unobserved – supply-side and pre-founding decisions in any analysis of race or gender.

A large labor literature (surveyed in Ioannides and Loury (2004)) documents a connection between early-life social networks and information sharing to job market outcomes. Several studies explore these questions for the decision to become an entrepreneur. Mishkin (2021) documents that a woman’s propensity to become an entrepreneur depends on whether her father was an entrepreneur. However, this channel is dampened when she has brothers. The paper argues that roughly 15% of the gender gap in entrepreneurship could be explained by this crowding out effect in early childhood. Additional evidence of experiences and network effects is found in Einiö et al. (2019). They find entrepreneurs create products that match their own demographics or experiences with certain groups. As most entrepreneurial firms are small and have few products, we can draw a connection between these results and industry of founding. Angel investors and venture capitalists are also susceptible to early-life experiences on their investment decisions. Duchin et al. (2021) show that CEO’s backgrounds, such as where they grew up and what type of high-school they attended, can predict how much they prefer to invest in projects managed by men.

Where one grows up also predicts entrepreneurship. Guiso et al. (2021) show that whether an individual grows up in an area with many firms predicts entrepreneurial entry. The results suggest that early-life social networks and contacts are likely unobservable factors in any analysis of gender or race in entrepreneurship.<sup>28</sup>

#### **6.2.4 Stereotypes**

Another explanation for the gender gap in entrepreneurship is stereotypes (Schneider, 2005; Bordalo et al., 2016), where both entrepreneurs and their potential investors hold beliefs that genders have productivity advantages in some industries or activities. These beliefs can impact the extensive margin (entry), startup industry, capital demand and investor

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<sup>28</sup>Also see Markussen and Røed (2017) show that entrepreneurial peers predict entrepreneurship in Norway. For a theoretical treatment of networks and employment choice Calvó-Armengol and Jackson (2004).

reaction to gender. This section briefly summarizes some important results that could help us understand the founding decision differences by gender. Reuben et al. (2014) conducts an experiment that reveals subjects hold stereotypes that men perform better at math than women. The differences in subject behavior changed little when provided full information about the potential hire.<sup>29</sup> Although their analysis applied to science career outcomes, expectations about this treatment could lead women to self-select into different industries, while investors that hold such stereotypes may prefer male founders.

Culture and self-stereotypes can also explain some of the sorting of women (less so by race) into certain industries. Laboratory evidence suggests that stereotypes of self and others could impact founding team formation choice and investors' assessment of such teams. Coffman (2014) shows that individuals contribute less to team production when individuals match with gender-incongruent tasks (Coffman, 2014). Several papers document female founders sort into "gender-congruent" industries (e.g., Hebert, 2020; Gompers and Wang, 2017b; Goldin, 2014). The tendency for occupational sorting will emerge in the discussion of financing outcomes, but there are possible positive effects. In their work on innovators in patents, Koning et al. (2020) document that the increased representation of female inventors coincides towards with a shift towards inventions that are better matched to the needs of women ("female-focused patents"). The innovative choices of lead inventors do not appear to be a simple substitution of inventor gender, but a shift in the composition of inventions. This result has implications for the continued increase in female and, to a lesser extent, minority participation in entrepreneurial firms and private equity.

### **6.2.5 Preferences and beliefs**

The final set of topics around the entrepreneurial founding decision concerns beliefs and preferences. To start, consider the financial calculation faced by a potential entrepreneur. An entrepreneur's founding decision depends on her assessment of the expected utility, weighed against the risk and outside options. Moskowitz and Vissing-Jørgensen (2002) document the

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<sup>29</sup>Del Carpio and Guadalupe (2021) conduct a similar analysis using a field experiment and conclude that the differential treatment for women could result in lower job applications to male-dominated sectors.

returns to private equity or entrepreneurial investment do not exceed that of public firms. In contrast, Levine and Rubinstein (2020) argue that self-employed workers who choose to incorporate their firm earn more than their salary-earning counterparts do.<sup>30</sup> Given the higher risk and low diversification associated with running a small business, if the expected return is indeed lower, then one must rationalize the entrepreneurial choice. The authors show that large non-pecuniary benefits or over-estimates of success could help explain these choices. These conclusions inform the results documented below because unequal capital access or discrimination by investors are impediments after the evaluation of the risk-return tradeoff. If the returns to entrepreneurship are worse for women or minorities (e.g., because of worse capital access or human capital), then the role of non-pecuniary benefits or expectations of success must be larger to justify entry.

Next, an individual's beliefs about their own ability and the abilities of their team can affect their decision to become an entrepreneur. Bordalo et al. (2019) and earlier work in Coffman (2014) find that individuals of all genders have lower self-confidence about their expected performance and are less willing to contribute idea in areas where their gender is stereotypically underrepresented. Their results speak directly to the investor-founder interaction at the deal formation stage because they show that stereotypes also impact beliefs about others. The experimental setting provides direct evidence for one source of incorrect beliefs and likely plays a role in some patterns observed in early-stage financing described below. Stereotypes about oneself and beliefs about the ability likely play a role in the occupational sorting observed in the economy, and startup industry choice specifically (Scott and Shu, 2017; Ewens and Townsend, 2020; Hebert, 2020; Gompers and Wang, 2017b). Last, women may hold themselves to higher standards when making choices about seeking capital or gathering resources (Chari and Goldsmith-Pinkham, 2017; Kolev et al., 2020) or have lower reported self-evaluations than men when interacting with investors (Exley and Kessler, 2022). Evidence for this characteristic's impact on entrepreneurs is found in

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<sup>30</sup>Add to this debate about the return to entrepreneurship any "founder penalty" related to the cost of leaving wage employment. The argument is that employers may be concerned about fit with former entrepreneurs. Kacperczyk and Younkin (2021) conduct audit and experimental studies that show a penalty for male, but not female ex-founders.

Howell and Nanda (2019) who show that random exposure to venture capitalists investors improves the chance of raising VC only for men. The gender difference stems from female entrepreneurs' reluctance to reach out to potential investors for capital.

An extensive literature explores differences in risk tolerance, preferences for competition and willingness to negotiate by gender.<sup>31</sup> Biasi and Sarsons (2020) results on differences in bargaining outside the lab are informative for startup formation. They find that after a law change that allowed for flexible pay, a pay gap between male and female teachers emerged (it did not exist prior) and is driven by male teachers' higher propensity to negotiate. Importantly, this difference is entirely driven by men's increased likelihood of bargaining with a male superior (there are no differences between the genders when the superior is female). Combined with experimental results (Babcock and Laschever, 2009; Dittrich and Leipold, 2014; Exley and Kessler, 2022), these differences in negotiation preferences could have effects on the interaction between founders and investors. On one hand, the bulk of VCs are white males (Gompers and Wang, 2017b). On the other hand, negotiating over sales of equity securities, board seats and other control rights is complex. Thus, preferences and skills in negotiation could impact entry choice and outcomes (e.g., through valuation or control rights).<sup>32</sup> Moreover, whether gender differences in risk tolerance are innate or driven by social stereotypes (e.g., see Booth and Nolen (2012) who use of variation in same-sex schooling) may not impact observational data on investor choices.

Next, differences in risk tolerance and preferences for competition emerge in nearly all studies of gender in entrepreneurship. Results that show entrepreneurs are more risk tolerant (e.g., Hvide and Panos, 2014). Croson and Gneezy (2009)'s review article provides a complete overview of the theory and empirical literature, which can be succinctly summarized as follows: women are more risk averse and more averse to competition than men.<sup>33</sup> These differences have clear implications for entry decisions and assessments of founders by investors

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<sup>31</sup>This discussion ignores personality traits of entrepreneurs. An extensive review of the literature and unanswered questions is in Kerr et al. (2017).

<sup>32</sup>Wiswall and Zafar (2018) find that undergraduates differ in preferences for job flexibility (women prefer) and these differences translate into college major and eventual job choice.

<sup>33</sup>Examples of laboratory work on these topics is Niederle and Vesterlund (2007) and Buser et al. (2014).

and have been tested in different ways in Ewens and Townsend (2020) and Hebert (2020). To date, there is only sparse evidence for the role of these preference differences in the founding decisions or funding outcomes.

The last set of beliefs concern the individual’s expectations about treatment by capital providers. If the founder knows little about the entrepreneurial ecosystem or gender gap in founding, they need only look at the facts about the wage gap (Blau and Kahn, 2017). Their own experiences with the standard labor market may mimic what researchers have found in audit studies with large employers (Bertrand and Mullainathan, 2004; Kline et al., 2021, 2021). One challenge faced by women and minorities raising capital is investors’ perceptions about differences in participation rates or outcomes. Indeed, as presented in the discussion of economic theories of discrimination, beliefs are central to how researchers separate explanations for differential treatment. If an investor believes that the lower participation rate of blacks follows from human capital or risk preference differences, then any differential treatment observed in the data could be explained by statistical discrimination. Alternatively, if the differences are believed to stem from past discrimination or opportunities, then differential outcomes at the investor stage could have little to do with bias or discrimination by investors. Rich survey and experimental evidence in Alesina et al. (2021) show that beliefs about inequities depend on political affiliation and for teenagers, their parents’ political affiliation. Such work extended to investors in private equity and venture capital would be an important step in the literature.

Finally, potential founders may simply assume the worst when they gather resources for their new firm. Fairlie et al. (2022) show just a possibility in their study of credit access differences by race (discussed more below). The most striking result from the work concerns the business owners’ attempts to close the gap by seeking more finance. Here, they find that fear of rejection matters:

“Black entrepreneurs apply for bank loans less frequently than white entrepreneurs. This stems largely from differences in the fear of rejection. Overall, black entrepreneurs are about three times more likely to state that they did not apply

for credit when needed for fear of having their loan application denied. [...] even black founders in the top quartile of the credit score distribution are more than twice as likely to report a fear of denial than white founders with below median credit scores.” (page 5)

This result is a reminder that equilibrium-thinking should guide interpretations of empirical results. Researchers should assume that underrepresented founders have read chapters like this and formed correct assessments of their success likelihoods, which impacts observed entry rates that researchers use.

**Lessons and next steps.** This section summarized a literature that helps us understand the gender and racial gap in participation of both founders and private equity investors. Any analysis of differential outcomes in funding or success must incorporate these explanations. In most datasets, the explanations are complex omitted variables that confound the estimation of objects like the coefficient estimate on “Female.” The topics above are non-exhaustive but should capture the bulk of the mechanisms that could generate differential entry. More research and improved data will help researchers continue to disentangle the relative roles of these channels. Researchers in entrepreneurial finance may benefit from moving into the lab to explore preference and beliefs in entrepreneurial settings.

### 6.3 Raising capital

This section summarizes the literature on the differences in financing outcomes for women and minorities. Absent significant personal wealth or collateralizable assets, founders of high-growth startups need to raise outside capital. Frictions in this step—i.e., financing or liquidity constraints—are the focus of large literature in economics and finance (e.g., Beck et al., 2000; Black and Strahan, 2002; Kerr and Nanda, 2011). Finance academics spend much of their research energy on financial characteristics of firms, ignoring all the other critical parts of running a new business. For example, Bhandari and McGrattan (2021) find that “sweat equity” – the business owners’ time and expenses to manage and build a business in the U.S. – is the same magnitude as the value of the fixed assets in those businesses. This

section’s analysis of capital raising applies to this setting, where those expenses (and fixed assets) demand that the firm raise external financing.

### 6.3.1 Debt

I now summarize the recent literature on borrowing by entrepreneurs and small business. This is an ideal place to start, as Robb and Robinson (2014) find that newly founded firm’s early top financing sources are personal balance sheets and external debt. The bank finance setting is relatively simple: startup seeks loan, meets bank loan officer(s), loan officer decides whether to extend loan and, if extended, on what terms. One natural place to look for impacts of gender and race is at the loan officer step. Such data is difficult to acquire in the U.S. and, to my knowledge, has been explored rarely in small business lending.<sup>34</sup> However, research on bank lending in India (Fisman et al., 2017) finds that loan officer and lenders personal characteristics predict lending. Lenders are more likely to lend to individuals with the same ethnicity, and those loans outperform others in the lender’s portfolio.

Blanchflower et al. (2003) is one of the first studies investigating discrimination in small business lending.<sup>35</sup> Using the 1993 and 1997 National Surveys of Small Business Finances, they explore borrower expectations and lending success rates by race. As shown in Fairle et al. (2020), black borrowers in these surveys expect to be rejected for credit and often do not even attempt to apply for loans. They document a higher loan denial rate for black applicants after controlling for a host of creditworthiness variables, education, wealth, and industry. Conditional on successfully borrowing, black business owners are charged higher interest rates (again, even after a large set of controls are included). When combined with the lower rate of application due to fear of rejection, these results point to significant barriers to credit for black small business owners.

One positive view of the lending market for underrepresented minorities and women is the credit score system. Indeed, the Federal Reserve concluded that credit score models

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<sup>34</sup>There is some evidence that loan officer gender is predictive of loan portfolio performance (Beck et al., 2013).

<sup>35</sup>A related Blanchard et al. (2008) study exploits similar data to explore the types of discrimination that could explain differential treatment of black, Hispanic and female small-business borrowers.

can predict credit outcomes and exhibit no bias against a particular race or gender (see Braunstein, 2010). Robb and Robinson (2018) find that forward-looking credit scores have similar predictive power with borrower characteristics across race.

Several studies investigate small business lending and entrepreneurship. Robust differences between cost of credit also appear in a study of female borrowers in Italy (Alesina et al., 2013). A common concern with such differences in the cost of debt is unobserved differences in risk. The authors find no evidence that female borrowers are riskier than their male counterparts. Another study of Italian small business borrowers (Bellucci et al., 2010) shows that female borrowers have more difficulty acquiring credit, though the cost of acquired credit is like that of male borrowers. This is also a rare study that connects borrower and loan officer gender, finding that female loan officers demand less collateral from female borrowers. Consistent with discrimination in lending markets, Chatterji and Seamans (2012) show that exogenous increases in access to credit card debt leads to more entrepreneurial entry for black entrepreneurs.

Finally, Fairlie et al. (2022) revisit the question of small business credit access for black entrepreneurs. The long time series of survey waves in the KFS allow them to track firms' ability to make us for any early-stage financing constraints. As found in other work, black entrepreneurs struggle to raise external debt at founding. This disadvantage remains up to eight years after firm founding, suggesting that information and firm experience do not close the gap.

The collection of results on debt finance for startups founded by disadvantaged minorities and women paints of picture of fundraising deficiencies. Few studies have at their disposal clean exogenous variation to tease out discrimination from incorrect beliefs or stereotypes. That said, the rich data on loan applications used in many of the research goes a long way towards ruling out standard rational explanations for gaps in debt finance.



### 6.3.2 Equity financing

After external debt, a common source of capital for the high-growth startups is equity provided by angel investors, venture capitalists, or private equity investors. Before detailing the literature on the role of gender and race in financing outcomes, consider some of the startup characteristics investors use in their investment decisions. In their survey of 885 investors, Gompers et al. (2020) seek to understand the venture capitalist’s decision-making. Most important for this chapter are their results on the role of the founding or management team.<sup>36</sup> The survey results show that VCs rank management team as the most important characteristic both for evaluating investment opportunities and assessing investment success. Thus, there is a clear path for gender or race to (implicitly or explicitly) to enter the financing outcomes reviewed below.

Gompers et al. (2020) also details the deal evaluation process (i.e., pre-investment screening). The interactions between investors and founders seeking capital involve direct inquiries from the former, pitches/presentations to investors in organized events or direct contact by entrepreneurs (Gornall and Strebulaev, 2020). These interactions often require that the investor make quick decisions with limited information, again providing an opportunity for stereotype formation, statistical discrimination, and inference of race in the constructivist view. Several studies of the deal evaluation stage show gender and race can emerge in decision-making.

First, evidence from founder video investment proposals (i.e., pitches) shows that investors respond to intangible characteristics, such as positivity, and treat genders differently in funding decisions based on delivery characteristics (Huang et al., 2021; Hu and Ma, 2021). Brooks et al. (2014) show in multiple settings that investors prefer the same pitches when presented by men, while attractiveness of the entrepreneur has additional predictive power. At the pre-funding stage, Kanze et al. (2018) document that investors ask male and female founders different questions. Questions posed to women are more likely to address issues around not losing capital or maintaining gains. The authors argue that investors’ gendered

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<sup>36</sup>Also see Bernstein et al. (2017) for an experiment on angel investors’ investment preferences. They similarly find that management team is the main feature of the startup for evaluation.

focus translates into different funding levels by gender.<sup>37</sup> Combined with the possibility that investors have costly, limited attention, the pre-financing information-gatherings setting may only amplify issues of incorrect beliefs and prejudice (e.g., Bartoš et al., 2016).

Absent a clear experimental strategy or clean exogenous variation that impacts the composition of founders, researchers have instead focused on creating comprehensive samples of firms that are plausibly seeking capital. With a sample of startups that demand outside capital, it is relatively easy to document any gaps in participation by gender or race. Challenges emerge when one aims to explain the gaps. As we will see, researchers focus on empirical predictions of the economic theories of discrimination detailed in Section 5. Ewens and Townsend (2020) build a risk set of capital-raising startups from data provided by AngelList.<sup>38</sup> The website platform allowed entrepreneurs to post investment opportunities and investors to signal interest in multiple ways. Some 16% of the entrepreneurs on the platform are women, again demonstrating stark differences in entry rates by gender. Male investors—over 90% of all active investors on the platform—express less interest in female-founded startups that are otherwise observationally like their male peers. This pattern reverses among the set of female investors.<sup>39</sup> Simply, investor gender predicts differential treatment by gender.<sup>40</sup> Using rich data on the entrepreneurial firms and founders, they rule out risk preference or monitoring advantage explanations. A test of outcome differences within the male investors’ portfolios shows that the preference for male founders is best explained by bias.

Two recent studies use near-population-level datasets of startups to study an ideal risk

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<sup>37</sup>The differences in questions at the early stage may also translate into how the VCs interact with their portfolio companies. For example, Egan et al. (2018) find that male bosses are more likely to fire or punish female employees after misconduct.

<sup>38</sup>Becker-Blease and Sohl (2007) surveyed angel investor platforms, gathering data on the founder proposals. They can thus ask what fraction of financing proposals are from female founders and what fraction successfully raise capital. They find that while only 9% of proposals originate from female founders, they experience similar funding success rates than male founders.

<sup>39</sup>Similar patterns are found in Einiö et al. (2019) who document homophily patterns among female-founded startups. Female-founded firms are more likely to raise capital from female investors and hire female inventors.

<sup>40</sup>In the long-run, increased participation by female investors could thus dampen gender gaps. Evidence for changing composition of investors is found in Calder-Wang and Gompers (2021). They show that male venture capitalists are more likely to hire female partners in their firm when they have daughters.

set of potential capital raising firms. Hebert (2020) studies the populations of incorporated startups in France to explore differences in founding and financing rates. Some 26% of firms have female founders and those firms are 18% less likely to raise external finance than male-founded firms. This capital raising disadvantage reverses when the analysis focuses on gender-dominated industries: women in women-dominated sectors are more successful in raising capital. Outcomes tests show that founders in sectors not dominated by their own gender outperform, which suggests investors use a higher threshold. The evidence is consistent with investors using context-dependent stereotypes when evaluating startups. Guzman and Kacperczyk (2019) build a similar sample of U.S. incorporated firms to study questions about the entrepreneurship gender gap. They first document that 17% of all such firms or those with a clear growth orientation are female-founded. These firms are 63% less likely to raise external finance. The authors decompose these differences in funding success and conclude that the majority is explained by initial firm characteristics. Differences in signals about firm growth prospects and investor sophistication suggest that much of the remaining funding gap could be explained by statistical discrimination.<sup>41</sup> These two papers demonstrate that rich observational data and a clean set of capital-seeking startups can provide insight on gender or racial funding gaps. The main challenges for teasing out explanations stem from incomplete information about the demographics of available investors and what information is available in their investment decision.

Some research suggests that women are not always at a disadvantage when seeking to or raising early-stage equity. First, Gornall and Strebulaev (2020) conduct a large field experiment that sent cold emails from fictional founders to real investors.<sup>42</sup> The experimental variation allows them to ask what is the effect of race (Asian) and gender on the response rates? They find a positive effect of female names, which is broadly consistent with some of the summary of other experiments summarized in Bertrand (2020).<sup>43</sup> Combined with the

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<sup>41</sup>These results do not incorporate the subsequent literature on incorrect or biased beliefs, so conclusions about the presence of standard statistical discrimination are limited.

<sup>42</sup>Also see Zhang (2020) for a set of field experiments on this issue. Bias for or against female and minority entrepreneurs depends on expectations of investor interaction with the startup.

<sup>43</sup>Data from surveys of angel investors platforms in Becker-Blease and Sohl (2007) shows that financing proposals sent by women to angel platforms experienced no difference in funding success than male founders.

results summarized above, the evidence suggests that bias in the later stages (e.g., Ewens and Townsend, 2020; Hebert, 2020) must reverse this early-stage preference for women. Next, Scott and Shu (2017) find that highly qualified women from MIT are less likely to become an entrepreneur if their idea lacks intellectual protection. However, women who decide to pursue their idea-full time experience no disadvantage at raising VC than their male counterparts. This result has limited generalization to broader gender gap and discrimination topics. Conditioning on entry generates a sample of founders who may be higher quality or difference risk preferences than the overall population of interest (the same critique applies to all studies that condition on fundraising).

### **6.3.3 Other capital sources**

Venture capital, angel financing, and external debt are just part of the capital options available to entrepreneurs. Recent changes in the debt and equity landscape allow the “crowd” to evaluate and invest in startups. Some argue increasing participation of retail investors and other non-traditional investors in entrepreneurial firms will increase competition and ensure that discrimination is more costly. As a preview, the evidence is mixed whether the crowd behaves differently than institutional investors. One area studies peer-to-peer lending platforms. Duarte et al. (2012) find that lenders on Prosper.com incorporate the appearance of the borrower in their decision. Borrowers whose pictures appear more trustworthy are more likely to raise funds and pay less for credit. They also find that those that appear more trustworthy have better credit scores and lower default rates. Pope and Sydnor (2011) find that black borrowers on the same platform raise debt at lower rates and, when successful, pay higher interest rates. There is no evidence that women experience lower rates of funding.

Younkin and Kuppaswamy (2018) and Gafni et al. (2019) study reward-based crowdfunding sites. The former finds that offerings managed by black entrepreneurs are less successful at raising capital. Gafni et al. (2019) find that, on average, female entrepreneurs are more successful, while backers (i.e., investors) prefer to contribute to same gender projects. The most recent change in the crowdfunding market is the introduction of equity sales (since

2016). We need more time and data for definitive answers on questions related to race and gender in this area.<sup>44</sup>

**Lessons and next steps.** The evidence on capital raising by women and minorities paints a picture of disparities across multiple platforms and sources. The three major types of discrimination detailed in Section 5 play some role in these patterns. For those studies that can identify the characteristics of investors, there is clear evidence of matching by own-gender and some evidence in favor of taste-based explanations. The literature’s next steps involve collecting better data about the supply and demand-side of the market, possibly adding surveys to assess expectations, stereotypes, and true outcome distributions (Bohren et al. 2019; Hu and Ma, 2021).

## 6.4 Outcomes

This last section asks whether gender or race of financed entrepreneurs predicts their startups’ success. Parker (2018) provides a thorough review of female and minority entrepreneurial firms’ performance across a range of small firm types. We first consider venture capital-backed firms.

Raina (2019) shows that the among VC-backed startups, female founded firms underperform. He exploits variation in the characteristics of the startup’s investors, finding that female underperformance is confined to those backed by male venture capitalists. The results suggest that even overcoming the gender or racial gaps at founding or financing may not translate to outcome equality. The differences could be explained by resource allocation choices of male investors or mismatch of skills between founder and investor. One counter-vailing force to this issue is the changing diversity of VC firms (e.g., Capital, 2021; Funds, 2019). Here, Calder-Wang and Gompers (2021) find that more VC funds with a more diverse team of general partners (in gender) perform better at the deal and fund-level.<sup>45</sup> Gompers et al. (2022) provide additional evidence that gender and racial composition of investing

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<sup>44</sup>Bapna and Ganco (2020) conduct a field experiment using a company raising \$846,000. Email solicitations to the 8050 subjects (i.e., the crowd) show that female investors prefer female founders, but male investors exhibit no differential treatment.

<sup>45</sup>Gompers et al. (2016) find that investing firms also exhibit within-group matching (e.g., by ethnicity).

firms matters for the partner's performance, and, by extension, the investments made by investors. They find female VCs underperform their male colleagues by 10-15%. This difference stems from female VCs' lower benefit from their colleague's skills and experience. Given the active role that VCs play in startups and the known matching within-gender, the incomplete resource sharing among VC partners poses significant costs to female and minority entrepreneurs.

The underrepresentation of Black and Latino founders in VC-backed startups results in insufficient information to make definite statements about outcomes. We can learn much about relative performance by race from the Fairlie and Robb (2008) work using Census data on small business. The story that emerges is best summarized by the authors:

[A] substantial proportion of black firms are less successful, leading to average outcomes that are worse than for white firms. In contrast to these patterns, Asian American-owned firms have average outcomes more similar to—and sometimes better than—those of white-owned firms. Overall, these racial patterns in business outcomes have remained roughly unchanged over the past two decades. (page 2)

These differences manifest as lower profits, higher closure rates and a striking difference in annual sales (\$439,579 and \$74,018 for white and black-owned business respectively). Fairlie and Robb (2007b) connect these outcome differences to detailed histories of entrepreneurs beyond the usual education and experience controls. They show that although business inheritance differs by race, it cannot explain success outcome variation. Instead, black entrepreneurs' lower experience working in both a previous family business and in their startup's industry helps explain much of the residual gap in startup performance. These human capital differences venture capitalists and private equity investors significant opportunities to add value to these Black-owned startups.

**Lessons and next steps.** This section documents actual differences in outcomes for startups run by women and black founders. Given the other features of early-stage financing, it is challenging to disentangle the sources of these disparities. It does not take much to argue that, at the least, lower rates of financing success, lower financing amounts and higher costs

of capital put these firms at a disadvantage. We need more research to separate out the role of pre-exit differences driven by discrimination and any role gender or race by at the exit itself (e.g., discrimination, risk tolerance, etc.)

## 7 Changes to the financing landscape

The disparities documented across the startup lifecycle and studied in the literature reviewed here could change for many reasons. In this section, we discuss three areas where change is most likely to impact gender and race in startups. The first is the regulatory environment that has changed the early-stage financing environment. Next, the changing supply of capital and technology connecting investor to investment impacts bargaining power. The last area represents directed efforts by governments and private entities to address the disparities head-on. Beyond a summary of the financing landscape, this section provides directions for future researchers' data collection efforts or searches for natural experiments.

### 7.1 Regulatory changes

Since 2010, new federal legislation and the changes implemented by the Securities and Exchange Commission have resulted in several major deregulations of the private capital markets. Congress, the White House, and regulators were motivated by (perceived) low capital access for some startups and an inability for retail investors to gain exposure to the private capital markets. Perhaps most relevant for our discussion here is the “democratization of capital access” for entrepreneurs and private firms. Each change attempted to lower barriers for entrepreneurs seeking to raise private capital, connect retail investors to startups, or lower the chances that traditional early-stage investors triggered costly regulatory triggers (see Ewens and Farre-Mensa, 2022, for a thorough review). If successful at lowering barriers, then the literature surveyed above provides some predictions about affects for women and minorities.

- Equity crowdfunding: part of the 2012 JOBS Act and implemented in 2016, companies

can sell equity securities on registered platforms up to \$1.07m per year. In 2021, this upper limit was increased to \$5m.

- Solicitation<sup>46</sup>: The JOBS Act also allowed startups to publicly solicit capital under Rule 506 if all purchasers of the securities are accredited investors and the issuer takes reasonable steps to verify that the purchasers are accredited investors.
- AngelList no action letter: In March 2013, the SEC effectively approved the creation of the AngelList platform that helped to connect startups seeking capital with accredited investors and institutional investors.<sup>47</sup> The SEC's response spawned several product offerings that facilitated early-stage capital raising on AngelList's website (previously interpreted as a solicitation)
- Reg A+: Often called the “mini-IPO”, the JOBS Act increased the amount of capital that could be raised in this type of public offering.
- Regulation D changes: The JOBS Act changed part of the most used registration exemption Regulation D. For example, Rule 504 allows firms to raise up to \$5m from an unlimited number of investors of any type (up from \$1m).

How if at all should these changes impact the facts documented in Section 6? Insofar as the barriers to high-growth entrepreneurship are driven by capital providers bias or information asymmetries, then these regulatory changes should increase investor competition and lower the cost of capital (e.g., Arrow, 1973). Such a view seems to be the common defense for such changes and was clear in the naming of the JOBS Act titles (e.g., “Access to Capital for Job Creators” and “Private Company Flexibility and Growth”). Work showing that banking deregulation improves capital access to small business points to such a channel (Black and Strahan, 2002; Kerr and Nanda, 2011). Increased competition between capital providers may not always lead to smaller gaps in race and gender. As Charles and Guryan (2008)

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<sup>46</sup>See <https://www.sec.gov/info/smallbus/secg/general-solicitation-small-entity-compliance-guide.htm>.

<sup>47</sup>See <https://www.sec.gov/divisions/marketreg/mr-noaction/2013/angellist-15a1.pdf>



summarize, if the market has imperfect information, imperfect competition, or adjustment costs (Lang et al., 2005), racial or gender gaps can persist if there are biased preferences.<sup>48</sup> Altonji and Blank (1999) summarize a theoretical literature where search costs are added to labor models and argue that increased competition does not always solve the issue (see Borjas and Bronars, 1989 and subsequent papers by Black, 1995 and Bowlus and Eckstein, 2002).<sup>49</sup>

Several of the changes include increases in information about available investments and investors. The crowdfunding and A+ rules require disclosures by firms and platforms. Related, the AngelList and similar platforms (e.g., FundersClub) that allow for limited solicitation have effectively provided standardized information for potential investors. Rather than deal sharing through personal networks over email or coffee, these platforms create some uniformity for offering documents and even facilitate communication on-platform. Thus, parts of the regulatory changes may lower information barriers for investors.

Gender and racial gaps in entrepreneurial firms raising capital could also decline after the changes because they encourage entry on not just more investors, but more capital providers from under-represented groups. Indeed, Lerner (2019) finds that VC and PE funds managed by minorities have increased 3.5% to over 5% from 2002 to 2017, while Pitchbook shows the percentage of female venture capitalists (GPs) in VC funds increased from 12% in 2019 to 15.4% in 2021. The barriers discussed in Section 6 could equally apply to an entrepreneurial investor from underrepresented groups seeking to build investment portfolios for others. Some products introduced by AngelList aim to help investors build their portfolios and find deals. For this channel to work at shrinking the financing gap, we need not assume that homophilistic preferences, industry sorting and even prejudice disappear. Instead, such preferences and actions can continue so long as the new entrant inventors continue to have own-type preferences in investing.

There are other reasons to predict that these changes that increased regulatory thresholds

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<sup>48</sup>These models are best thought of as racial or other-gender “distaste” where workers do not want to work with out-groups (nor employers hire).

<sup>49</sup>The idea in most of these models is that the whole distribution of prejudicial taste of firms drives results rather than just the standard marginal firm as argued in Becker (2010).

and advertising rules would have little impact on female and minority entrepreneurs. Both groups tend to cluster in industries with lower capital needs and, in some cases, ask for less capital within the industry. Higher thresholds for capital raising regulation avoidance will not help here. The increased ability to solicit capital publicly requires both an audience and, more importantly for inequality, an audience screened by income or wealth. If disadvantaged groups have worse networks or lower wealth levels, then these deregulations may not improve capital access.

Several research questions emerge from this discussion. First, is there any direct evidence that disadvantaged groups have used these rule changes to raise capital? It would be interesting to see a full aggregation of capital raised by race and gender that incorporates VC, angel, crowdfunding, etc. Second, what model of the investor landscape—substitutability, mobility, value-add and competition – could help us understand the complex interactions between the startup financing frictions documented here and entry by new investors?

## **7.2 Market changes**

Connected to some of these recent regulatory changes are macro-level changes to private equity markets and financing technology. Each could have similar predicted impacts on access to capital for startups and deal flow for investors. In each case, the changes to the financing ecosystem may weaken of the power of the gatekeepers and thus attenuate the role of bias or discrimination.

### **7.2.1 Changes to capital supply**

The private equity financing landscape has changed significantly over the last 25 years (Ewens and Farre-Mensa, 2022). The changes can in part be explained by regulatory changes, but otherwise appear to be driven by participation of new investors and financial innovations. At the same time, academic and anecdotal evidence shows that the balance of power between capital supply and demand has shifted to the latter. The growth of private capital markets can be partially tied to a major deregulation in 1996 which lowered the barriers to private

equity across state, while allowing private equity investors to raise larger funds (Ewens and Farre-Mensa, 2020). The authors find that since 1996, valuations paid by early-stage investors have increased significantly. Valuations of VC-backed startups have only continued to climb in the last decade.<sup>50</sup> Researchers have also documented higher levels of participation by non-traditional investors: mutual funds (Agarwal et al., 2021; Kwon et al., 2020; Chernenko et al., 2021), hedge funds (Aragon et al., 2018), growth equity investors and limited partners (Lerner, 2019). This shift in investor composition translates to an increased supply of capital and presumably more competition between investors. Any lowering of the cost of capital for entrepreneurs or higher probability of raising follow-on financing (Nanda and Rhodes-Kropf, 2016) could disproportionately benefit disadvantaged entrepreneurs.

Other changes are worth mentioning as they likely have similar effects but have not been explored in depth in the context of race and gender. Researchers have documented an increase in venture debt, a relatively new form of non-dilutive finance used by VC-backed startups (Davis et al., 2020). Data from Pitchbook<sup>51</sup> shows significant growth in secondary liquidity for VC-backed startups in the last 10 years: \$500m per year from 2012 to 2015 to roughly \$2b since 2015. Such liquidity offered to startup founders lowers their risk and could have long-term impacts on entry choice. Finally, new proposed rule changes could have consequences for the supply of capital provided to venture capitalists and private equity funds. In 2020, the Department of Labor issued a letter<sup>52</sup> detailing a potential change to 401(k) rules that would allow private equity fund investments. Not only would this change increase the supply of capital to the PE industry, but it would also increase the diversity of the limited partner (i.e., investors in PE) pool. The myriad of supply level and composition changes detailed here demands new investigations from the perspective of race and gender.

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<sup>50</sup>See the Pitchbook 2021 Q2 Valuations Report (<https://pitchbook.com/news/reports/q2-2021-us-vc-valuations-report>). For example, the median early-stage valuation increased approximately \$9m in 2011 to \$22m in 2020.

<sup>51</sup>Author's calculation searching for VC-backed startups with secondary transactions (September 2021). <https://my.pitchbook.com/?pcc=522996-49>.

<sup>52</sup>See <https://www.dol.gov/newsroom/releases/ebsa/ebsa20200603-0>.

### 7.2.2 Fintech and data availability

The high-growth financing landscape has also experienced several technological changes that could impact gender and racial disparities. First, Ewens et al. (2018) show that introducing Amazon Web Services changed the capital needs of startups. This change affected the characteristics of funded startups, the types of investors and investor governance choices. Most of these changes coincided with relatively cheaper capital and thus lowering barriers for disadvantaged entrepreneurs and investors. New entrepreneurial firms themselves are introducing novel financing for startups that could change the bargaining power between investor and founder (e.g., Stripe’s capital offering, Pipe’s non-dilutive financing from recurring revenue, etc.). Investors are also the beneficiaries of innovation in this space with new technologies that should lower the barriers to entry for women and minorities, angel investors and GPs (e.g., AngelList, Carta, Stripe and Aumni among others). Finally, startups are often at a disadvantage when raising capital from sophisticated investors demanding complex securities in return for capital (e.g., Kaplan and Strömberg, 2003; Ewens et al., 2022). Since 2007, new data providers covering VC and private equity have emerged.<sup>53</sup> Possibly in response to competition, these data providers produce regular, informative reports on valuation (Pitchbook valuation report, 2020), deal terms (Silicon Valley Venture Capital Survey from Fenwick and West), exits and investors (2021 Preqin Global Private Equity & Venture Capital Report). To the extent that these data providers can lower information asymmetry, this could improve the prospects of entrepreneurs, particularly those outside the networks or experience where such knowledge is common.

## 7.3 Targeted programs and funds

One reason we might predict that government interventions in entrepreneurial finance might help mitigate differential outcomes by race or gender in entrepreneurship is the government’s non-financial motives. The non-profit sector is thus a natural place for alternative solutions

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<sup>53</sup>Three of the major data providers on private equity and venture capital were formally launched after 2007: Pitchbook (in 2007), CB Insights (in 2008) and Crunchbase (in 2015).

to the entrepreneurship gaps documented in the chapter. Indeed, a host of such groups have emerged in the last decade. These include Venture Forward by the NVCA (underrepresented groups), All Raise (women entrepreneurs), VCFamilia (Latino investors) and BLCK VC (black investors).

That said, it is still unclear what the optimal mechanism is for addressing the gaps in funding and outcomes. If one accepts that bias or discriminatory preferences are slow to disappear and existing investors have market power, then non-market solutions, such as the government and non-profits, are a reasonable strategy. It is also not clear what part of the startup lifecycle (Section 3) is best to target. Table 1 shows that even sizeable gaps exist at the earliest founding decision, pointing to programs targeting education and early resource gathering. Addressing frictions for firms founded by women and minorities that successfully raise capital is more difficult, as one must work with existing investors.

## 8 Ideas for future research

The constant evolution and adaptation of entrepreneurial firms and their ecosystems provide ample opportunities for researchers to fill some gaps in the literature summarized above. Technological change can affect the economic frictions faced by both the supply and demand sides. Regulatory changes can shift the balance of power. This section details some unaddressed topics at the intersection of entrepreneurial finance, gender, and race.

- Many cells in Table 1 are empty because of incomplete data or a lack of studies focused on race. Additional data is required before we can understand the gap in high-growth entrepreneurship by race. Several organizations have attempted to fill these gaps with surveys or proprietary data (e.g., Capital, 2021; Lerner, 2019), opening the door to academic to expand and provide continuity.
- Deeper analysis of the Altonji and Blank (1999) distinction between “current market discrimination” and “pre-market discrimination” for entrepreneurs. The role of wealth, networks, education, and information differs by race or gender before any founding

decisions are made. Understanding these disparities (e.g., Derenoncourt et al., 2022) and their own sources is critical to any policy implications.

- Similarly, there is an entrepreneurship policy implication of the Boerma and Karabarbounis (2021) model of wealth accumulation. They argue that “centuries-long exclusions lead Black [households] to hold pessimistic beliefs about risky returns and to forgo investment opportunities after the wealth transfer” (page 1). This friction makes investment / entrepreneurship subsidies relatively more effective than direct transfers. It would be interesting to explore the relative effectiveness of past race-based entrepreneurship policies on the wealth gap. The paper also suggests that there are racial differences in beliefs about risk returns that could help explain differences in entrepreneurial entry.
- We know little about how expected rejection or poor deal terms explain the low rate of participation by women or minorities in entrepreneurship. Survey evidence on this question would be an important first step, particularly among would-be entrepreneurs.
- A stark pattern of changing bargaining power between entrepreneurs and investors has emerged in several areas. Valuations for startups are increasing (Ewens and Farremensa, 2022), contract terms are becoming more entrepreneur-friendly, founders are more likely to have dual-class shares (Aggarwal et al., 2022) and corporate governance power has shifted to entrepreneurs (Ewens and Malenko, 2022). How do these bargaining power shifts impact the gender or racial gap at entry and financing?
- The literature reviewed above finds that cost of credit differs by race and gender. Many entrepreneurial firms sell complex securities that are a combination of cash flow and control rights (e.g., Kaplan and Strömberg, 2003; Ewens et al., 2022). If one incorporates these terms into the prices paid to entrepreneurs, do the gaps between races and gender change?
- Addressing the host of explanations for differential treatment stemming from the models in Section 5 is significantly easier when the data at the researcher’s disposal has

information about both supply and demand. Demographics about investors, loan officers and, most important, information about the set of investments considered by these players are critical to understanding the channels at play.

- The role of geography in capital availability is a common topic for policymakers who are trying to improve capital access for local entrepreneurs. Researchers have shown that entrepreneurs often move in response to this agglomeration of resources (Conti and Guzman, 2021; Chen and Ewens, 2021). These issues likely only exacerbate the resource constraints, particularly for minorities.
- Sarsons et al. (2021) demonstrate bias in credit attribution by gender in the academic setting, while Exley and Kessler (2022) show that women are less optimistic in self-evaluations. Investors and co-executives as startups may exhibit similar biases in startups, leading to sub-optimal resource allocation or refinancing decisions.
- The patterns of own-gender matching found in several papers often motivate predictions about increased participation of female and minority investors. On one hand, this response to gaps in financing and outcomes does not address any deeper issues of stereotypes or bias. On the other hand, the entrepreneurial finance ecosystem has only recently experienced an increase in underrepresented group participation on the supply-side. These new investors are more likely to be inexperienced, which could affect the impacts of their entry. Exploring the real impacts of investor entry would be fruitful.
- This review and existing research have focused primarily on two groups: women and blacks. More research is needed on other disadvantaged groups, with the caveat that many of the differential treatment explanations such as stereotypes or risk preferences do not connect as cleanly to race or ethnicity.
- Major questions about access to capital and outcomes could be revisited using the “constructivist” perspective (Rose, 2022) discussed in Section 5.6. The suggestion in

Rose (2022) for instruments that shift perceptions of race point to new experiments, while the normative choices around decision-relevant observables could be guided by expanded surveys following Gompers et al. (2020).

- This handbook’s private equity topic is only partially covered in this chapter. It has no discussion of the larger parts of the private equity landscape: buyouts, growth equity, mezzanine, and distressed debt. I am unaware of any published work in this area. One explanation is that gender or race is difficult to map to the typical transaction. For example, when a buyout fund takes a public company private, there are often several general partners (GP) running the deal. This fact makes assigning gender or race to a deal difficult. However, after the private equity firm acquires a target or takes a controlling stake, the setting begins to mimic that explored in the chapter. Topics of interest here could include the role of GP team gender or racial composition on PE deal performance or deal structure. GPs in buyout funds often reorganize top managers, inviting analysis of manager selection and possibly compensation.

## 9 Conclusion

This chapter reviews the literature on the intersection of entrepreneurial finance, race, and gender. While significant progress has been made studying the gaps in participation and funding by gender and race (see Table 1), the entrepreneurial finance literature has numerous databases to build and unanswered questions to answer. This chapter aims to provide the tools and knowledge to guide this process with a thorough review of the economics of discrimination and empirical literature on discrimination in entrepreneurial finance. The benefit of answering these questions is not simply improving academia’s knowledge of an important economic phenomenon. Discovering the sources of differential treatment and outcomes in startups will guide policy solutions for agents in the marketplace (e.g., investors and entrepreneurs) and regulators.



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## 10 Tables

Table 1: Representation statistics in entrepreneurial finance

The table reports statistics on the participation of women and minorities across multiple stages of the startup lifecycle. “% women” is the percent of firms with at least one female founder (unless otherwise showed). “% Black” is the percent of firms with at least one black founder. Sometimes, this column is the percent of non-white or minority founders. The “Notes/Source” column provides a short summary of the variable and references.

	% Women	% Black	Notes/Source
<b>Panel A: New firms (before capital)</b>			
Incorporated firms (NLSY)	28%	10% (non-white)	Share of self-employed individuals in incorporated firms from NLSY79 1982-2012. Levine and Rubinstein (2017, Table 1 Panel B)
CA/MA newly incorporated firms	22%		Newly incorporated firms in California and Massachusetts, 1995-2005. Guzman and Kacperczyk (2019)
Entrepreneurial entry rate (relative)	64% (lower rate)	78% (lower rate)	The relative rate of the adult, non-business owner population that starts a business (both incorporated and unincorporated, employers or non-employers) each month, averaged 1996 to 2020. Fairlie and Desai (2021, Table 2 and Table 3)
Small business owners	29.9%		Women-owned firms as a percentage of all in 2012. Survey Small business owners. Robb et al. (2014, Appendix 3)
Team size / employment at start (relative to men)	7% smaller / 20% fewer employees		Ewens and Townsend (2020, Table 2 “Team size”) [7%]. Hebert (2020, Table 2, Panel E) [20%]
<i>High-growth startups (subset of new firms)</i>			
Incorporated firms CA/MA	17%		Share of female-led startups in top 10 percent high-growth startups in California and Massachusetts, 1995–2005. Guzman and Kacperczyk (2019, Table 2)



Equity crowdfunding startups	16%		The percentage of startups with female founders. Startups based in the United Kingdom, 2012–2017. Hellmann et al. (2021, Table 2, Panel A)
Angel-backed startups	16-28%	19.4%	For gender: firms with female CEO/founders as a percentage of the entrepreneurs that are seeking angel capital. Ewens and Townsend (2020, Table 1); Sohl (2020). For race: the share of minority-owned firms in the entrepreneurs that presented their business concept to angels. Sohl (2020).
Innovation goals (relative to men)	19-40% lower		Hebert (2020, Table 2) “High-growth oriented” [19%]. Global Entrepreneurship Monitor 2021 Table A7 (Bosma and Levie, 2010), U.S.-based startups: relative rate of starting innovative product or service-based firm. [40%]
“High impact” startups	12.4%		Percent of firms with female founder whose sales have at least doubled over a four-year period and which have an employment growth quantifier of two or more over the same period with employee-size 1-19 from 2004-2008, SBA data. Tracy (2011, Table 15)
<b>Panel B: Capital raising by founder (at least one women or minority)</b>			
Bank finance: relative rate business loans		50% less likely	The relative rate of black vs. non-black small businesses acquiring small business bank finance. 2004–2011 KFS, Fairlie, Robb, and Robinson (2020, Table A.4)
All VC fundraising (deals)	14.5%	2.4% (+Latino)	Women: US deal value for female-founded companies as a share of all VC deal in 2020. PitchBook Venture Monitor Q4 2021 (p23). Black: Share of dollars invested in startups founded by black or Latino entrepreneurs. Crunchbase “Funding to Black & Latinx Founders” report, 2020.

Incorporated firms with VC	10%		Share of female-led start-ups across firms that get venture capital in California and Massachusetts, 1995–2005. Guzman and Kacperczyk (2019, Table 2)
Form D filers (private capital raising)	10%	4% (Black & Hispanic)	Percentage of non-financial firms that raise capital in reliance on Regulation D, 2010-2019. Yimfor (2021)
Early stage capital / angel	21-24%	11.5%	The percentage of women entrepreneurs received angel investment (the yield rate) in Q1,2 2019. Sohl (2020) The percentage of female/nonwhite startup CEOs in 2018. 2019 ACA Angel Funders Report (p13).
Small business fundraising	34.6%		Percentage of financial capital invested in women owned businesses, Kauffman Firm Survey 2016. Coleman and Robb (2009, Table 3)
Equity crowdfunding success	Same		Using equity crowdfunding data in the UK, Hellman, Mostipan, and Vulkan (2019, Table 4) find gender does not have a significant effect on campaign success.
Crowdfunding success (Kickstarter) (relative)	6% higher		Women entrepreneurs have a higher rate of success (82%) than men (76%). Kickstarter, 2009–2012. Robb, and Sade (2019, P23) Also see Greenberg and Mollick (2017), Johnson et al. (2018).
<b>Panel C: Investors and funds</b>			
Angel investors	26.5-30%		For 2020 (26.5%), the number is US VC deal count in female-founded companies with female angel participation as proportion of all deals with angel participation. All In Female Founders in the US VC Ecosystem 2021(p19) For 2021 (30%): “The Angel Investor Market in Q1Q2 2021: A Market Stabilizing During the Vaccine Rollout”, Center for Venture Research, December 15, 2021.

VC Investors (GPs)	16%	22% (nonwhite)	Female GPs as a share of all US GPs. All In Female Founders in the US VC Ecosystem 2021 (p8-9). Percentage of female/nonwhite employees among investment partners in 2020. Deloitte VC HumanCapital survey March 2021 (Figure 1 & Figure 2)
VC funds controlled	5.6%		“Women in VC” report October 2020, “The Untapped Potential of Women-led Funds.” “Women-led funds”. Funds I-III using Prequin as benchmark for all funds.
PE funds controlled	7.2%	5.1%	Share of women/minority-owned firms in all funds. Lerner (2021).
<b>Panel D: Outcomes</b>			
Newly public firm (IPO) CEOs	<1%-3%		Shontell, 2021 (BusinessInsider), Nasdaq data, 2020 [<1%].  Percent Women by Function in All EGF IPOs from 1996–2010 [3%]. Kenney and Patton (2015, Table 4)
Successful VC exits founders	19.4%		Share of female-founded companies in venture-backed exits in 2019. All in Female Founders and CEOs in the US VC Ecosystem 2020 (pp 18).
Share of total exit valuations in VC	8.7%		Share total exit valuation associated with female-founded companies in all VC exits (2019). All in Female Founders and CEOs in the US VC Ecosystem 2020 (page 18).
Incorporated firm acquired or IPO	7%		Share of female-led startups across firms that got IPO or acquisition in California and Massachusetts, 1995–2005. Guzman and Kacperczyk (2019, Table 2)
Angel-backed startups success	42% (lower rate)		The relative rate of startups that got IPO or acquisition. First-time fundraising events for US startups founded between 2010 and November 2015. Ewens and Townsend (2020, Table 2 Panel B)

## Appendix A Data sources

This section lists the major data sources used by researchers in the papers referenced above. This list is non-exhaustive but should nonetheless provide an excellent starting point for interested researchers.

- **Current Population Survey:** used for the Kauffman Foundation “Early-stage Entrepreneurship” reports. From Fairlie and Desai’s summary of the index: The CPS is a monthly survey of approximately 60,000 households and is the official source used to calculate the household-based measure of the unemployment rate by the U.S. Bureau of Labor Statistics. These surveys, conducted monthly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics, represent the entire U.S. population, and contain observations for over 130,000 people each month. The survey primarily asks questions focused on the employment status of household members, including whether they are unemployed, out of labor force, wage/salary worker, or a business owner (page 3).
- **Venture capital databases:** coverage of startups, financings, investors, and outcomes
  - These include Pitchbook, CB Insights (VentureSource), Crunchbase, Preqin and Thompson VentureXpert.
- **Form D data:**<sup>54</sup> regulatory filings with the SEC for securities registration exemption requests. Includes startups that raise outside equity and convertible debt and has information about directors, executives, startup location, capital raised and security type.
- **Small Business Credit Survey:** survey of small business credit conditions run by the 12 regional Federal Reserve banks.<sup>55</sup> The survey has been run since 2014, with additions for race and gender variables in the last few years.

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<sup>54</sup><https://www.sec.gov/dera/data/form-d> See Ewens and Malenko (2022) Internet Appendix for details on Regulation D compliance and issues with Form D availability.

<sup>55</sup>See <https://www.fedsmallbusiness.org/about>

- **Kauffman Firm Survey** <sup>56</sup>
  - panel data covering 4,928 startups from 2004 to 2011 that have information on financing choices, financing outcomes, creditworthiness, and credit expectations.
- **OpenCorporates**<sup>57</sup> (related Startup Cartography Project<sup>58</sup>): incorporation data for most of the United States. It provides information on new firms and some information on outcomes.
- **Survey of Business Owners** (last run in 2012)<sup>59</sup>: survey of all firms with less than 500 employees that included information on firm size, use of financial services, and the income and balance sheet.
- **5-Percent Public Use Microdata Sample (PUMS) Files (2000)** <sup>60</sup>: 5% sample of U.S. Census individual data. See Fairlie et al. (2022) for their data on marriage rates by race.
- **Job Patterns For Minorities And Women In Private Industry (EEOC)**<sup>61</sup>: “periodic reports from public and private employers, and unions and labor organizations which show the composition of their workforces by sex and by race/ethnic category.” See Gompers and Wang (2017a).
- **Global Entrepreneurship Monitor**<sup>62</sup>: “carries out survey-based research on entrepreneurship and entrepreneurship ecosystems around the world. GEM is a networked consortium of national country teams primarily associated with top academic institutions.” Data is available on entrepreneur behavior, attitudes, and institutional setting for most countries in the world.

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<sup>56</sup>See <https://www.kauffman.org/entrepreneurship/research/kauffman-firm-survey/>

<sup>57</sup>See <https://opencorporates.com>

<sup>58</sup>See <https://www.startupcartography.com/data>

<sup>59</sup><https://www.federalreserve.gov/pubs/oss/oss3/nssbftoc.htm>

<sup>60</sup><https://www2.census.gov/census.2000/census2000/PUMS5.html>

<sup>61</sup>See <https://www.eeoc.gov/statistics/job-patterns-minorities-and-women-private-industry-eeo-1>

<sup>62</sup>See <https://www.gemconsortium.org/data>

- **General Social Survey**<sup>63</sup>: survey on “what Americans think and feel about such issues as national spending priorities, crime and punishment, intergroup relations, and confidence in institutions.”

## Appendix B Identifying race and gender

This section discusses several of the methods used by researchers to identify race and gender in data that may lack such identifiers. The potential bias in any algorithm (Obermeyer and Mullainathan, 2019) should inform any use of the suggestions below.

### Gender

Several public and commercial datasets provide mappings of probabilities of race and gender using first names. A popular source of name-gender mapping is the Social Security Administration’s database.<sup>64</sup> An open-source R package “gender” allows users to connect to other government databases.<sup>65</sup> Commercial providers with API access include Genderize.io and Gender API.<sup>66</sup> They built these name databases for American and Northern European datasets. Pictures can also assign gender; however, privacy issues appear to result in brief lives for many of the services.<sup>67</sup>

### Race

Race assignment can use pictures as with gender. Surname databases such as the Decennial Census Surname Files<sup>68</sup>. and related APIs<sup>69</sup> are the most popular way to assign a probability of race to an individual.

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<sup>63</sup>See <https://gss.norc.org>

<sup>64</sup>See <https://www.ssa.gov/oact/babynames/limits.html>

<sup>65</sup>See <https://rdr.io/cran/gender/man/gender.html>

<sup>66</sup>See <https://genderize.io/> and <https://gender-api.com/>

<sup>67</sup>As of chapter submission, this service was available: <https://www.kairos.com>.

<sup>68</sup>See <https://www.census.gov/data/developers/data-sets/surnames.html>

<sup>69</sup>See <https://www.census.gov/programs-surveys/decennial-census/data/api.html>.