

Gender Stereotypes and Entrepreneur Financing

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Abstract

I examine gender differences in external equity financing using administrative data on the population of start-ups in France. Female-founded start-ups are 18% less likely to raise external equity including venture capital. However, the gender funding gap reverses in female-dominated sectors, where female entrepreneurs are more likely to raise funding than male entrepreneurs. Moreover, I show that conditional on being backed with equity, entrepreneurs outperform in gender-incongruent sectors, suggesting that requirements for funding are higher for entrepreneurs that are minority in gender-incongruent sectors. The evidence is consistent with the existence of context-dependent stereotypes among investors.

Keywords: Entrepreneurs, venture capital, gender gap, beliefs, stereotypes

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1. Introduction

Is it worth being different? The large literature on discrimination against gender and racial minorities suggests it is not. For example, within symphony orchestras, female musicians are less likely to be hired (Goldin and Rouse, 2000). In the US, “Lakisha” and “Jamal” are less likely to be invited for an interview than “Emily” and “Greg” (Bertrand and Mullainathan, 2004). At S&P 500 firms, women make up 19% of board members and merely 5% of CEOs (Adams and Ferreira, 2009). Within a male-dominated academic field, such as economics, 33% of new PhDs are female, and 14% hold a full professorship (CSWEP, 2018). In high-growth entrepreneurship, while female entrepreneurs represent approximately 30% of the population of start-up founders across time and countries, 10–15% of them succeed in receiving private equity (PE) and venture capital (VC) financing (Levine and Rubinstein, 2017; Gompers and Wang, 2017b; Ewens and Townsend, 2019).

In this paper, I ask whether female entrepreneurs are at a disadvantage in raising capital from external equity investors, and, if so, whether this is still the case in gender-congruent environments, in which female entrepreneurs constitute not a minority but the dominant group.¹ The answers have implications for determining the optimal regulatory response, if any, and more broadly, for understanding how investors’ beliefs affect the development of young firms. Traditional explanations of the gender gap include gender differences in human capital accumulation, risk attitudes and preferences (e.g., Niederle and Vesterlund, 2007; Sapienza, Zingales and Maestripieri, 2009; Bertrand, 2011; Cook et al., 2018). As a result, women would not choose to start a new venture, or if so, with different motivations, or in a different sector. Another strand of the literature suggests that the gender funding gap may be due to a lower propensity for investors to fund female entrepreneurs seeking capital. This view stems from the fact that over 90% of venture capitalists (VCs) are men, resulting in difficulties in selecting and advising female entrepreneurs (Gompers et al., 2014; Howell and Nanda, 2019). Nevertheless, it is also possible that some investors may be biased against women.²

¹Boards of directors and the mutual fund industry have been traditional settings in finance to study gender-related issues. They are heavily male-dominated and do not allow for a reversal in the representation of women (e.g., Adams and Ferreira, 2009; Niessen-Ruenzi and Ruenzi, 2018). A richer cross-section of environments is needed to test the gender congruity hypothesis. Very few studies have actually considered the interaction between gender and the gender-dominance of a domain (Coffman, 2014; Bordalo et al., 2019).

²In the summer of 2017, several cases of discrimination against women in technology companies (e.g., Uber, Google) and VC firms (e.g., Kleiner Perkins Caufield & Byers, 500 Startups) highlighted the treatment of women in Silicon Valley (source: <https://goo.gl/VmLJNq>). Other anecdotal evidence includes, for instance, the investor John Doerr who summed up his philosophy as follows: “Invest in white male nerds who’ve dropped out of Harvard or Stanford”, or the Witchsy cofounders who created a fake male cofounder named “Keith Mann” to reach VCs via email and received an unprecedented number of replies.

A key challenge for my study is that entrepreneurs' abilities cannot be directly observed.³ We do not know whether start-ups that did not raise capital had their applications rejected because they were objectively lower quality projects than those that were funded or for other reasons. First, the profile of firms that could use VC but do not could provide a useful counterfactual to understand what makes a good candidate from an investor's point of view. In addition, the under-representation of female entrepreneurs among successfully funded entrepreneurs does not necessarily point toward a differential treatment of women by investors: only the *disproportion* between funded entrepreneurs by gender and their participation in the population of start-ups does. However, traditional datasets only provide information about firms that have successfully raised capital in public or private equity markets.

In this paper, I combine a large-scale representative survey of the population of French entrepreneurs with the corporate tax files available for every firm in France every year from 2002 to 2015. The first advantage of using administrative data is that the dataset is not subject to selection biases. Second, I can compare the proportion of successfully funded entrepreneurs from a certain gender group to the frequency of this group in the sector. Third, for each firm, the dataset contains detailed project characteristics, including financing sources, founders' biographical characteristics, and their *ex-ante* motivations and ambitions for the new venture.⁴ Fourth, because of the panel nature of the corporate tax files, I can characterize differences in the growth and performance of firms from the very early part of their life cycle.

My findings are broadly consistent with context-dependent stereotypes. Although female-led start-ups are *on average* 18-27% less likely to be financed by external equity investors, I find that this gap reverses in female-dominated sectors.⁵ Female-led start-ups in female-dominated sectors (gender-congruent sectors) are equally to 3-5% more likely to raise capital relative to their male counterparts in these sectors and are significantly more likely to raise capital relative to female-led start-ups in male-dominated sectors (gender-incongruent sectors).⁶ Thus, female and male entrepreneurs are more likely to raise external equity in gender-congruent sectors.

³Past performance of newly created firms is not available as well (Bottazzi, Da Rin and Hellmann, 2016).

⁴The survey is run every four years on a new cohort of randomly selected entrepreneurs that represents approximately 25% of the population of new firms founded that year (see Landier and Thesmar, 2008; Hombert et al., 2020, for other use of the data). Entrepreneurs' personal traits, risk aversion, and overconfidence levels to explain entrepreneurial entry and financial decisions at young firms (Moskowitz and Vissing-Jorgensen, 2002; Landier and Thesmar, 2008; Puri and Robinson, 2013; Kaplan, Klebanov and Sorensen, 2012; Hvide and Panos, 2014; Levine and Rubinstein, 2017; Kerr, Kerr and Xu, 2018).

⁵Male- and female-dominated sectors are classified according to the gender distribution of entrepreneurs by sector. The baseline measure defines a sector as female-dominated if more than 50% of its population of start-ups is female-led. These sectors represent 11% of the sectors at the 4-digit French SIC. I provide alternative measures of gender-dominated sectors based on the populations of CEOs, business owners and business owners at new firms.

⁶The fact that the gender gap that the gender funding gap is more pronounced for female entrepreneurs in male-dominated sectors than for male entrepreneurs in female-dominated sectors suggest the coexistence of multiple sources of discrimination that are not equally distributed across sectors.

Differences in education, past industry experience, prior entrepreneurial experience, motivations, optimism and initial start-up size do not fully explain the asymmetric gender funding gap across sectors. However, the findings show that highly educated, highly motivated, optimistic and serial entrepreneurs, both male and female, significantly increase their chances of raising equity financing, albeit with the effects being more moderate for female entrepreneurs. I also consider the influence of starting as a team and of being married. Interestingly, gender no longer explains funding outcomes when the start-up is founded with the spouse.

Female entrepreneurs may also be less likely to demand external equity financing in the first place.⁷ To overcome this concern with the interpretation, I run three robustness tests. First, I restrict the control group to entrepreneurs who do not use external equity but reported the ambition to grow their start-up, or managed to secure either bank debt, household debt, or a subsidy. I still find that female-led start-ups are less likely to raise and use external equity.⁸ Second, I check that start-ups' capital structure at creation does not significantly differ across gender groups. Third, I confirm that female entrepreneurs are less likely to rely on external equity relative to males who invested similar amounts of capital at creation.

Many other unobservable differences could still explain why entrepreneurs are less likely to be raise capital in gender-incongruent sectors. Indeed, women could simply be better at female activities and men better at male activities, in a way only observable by equity investors. The solution is to design an "outcome test" (see Becker, 1993). This approach consists of comparing the future performance of start-ups *conditional on* raising external equity. If at the selection stage, requirements for funding are set at the correct level, we would not observe any systematic differences in performance between the two groups. In contrast, if one group has been favored by investors, this group should underperform relative to the other group, under the assumption that entrepreneurs' abilities are constant over time.⁹

⁷The likelihood of using external equity financing is an equilibrium outcome. To the best of my knowledge, consolidated datasets of applications in the PE-VC industry do not exist. A VC firm typically chooses to invest in 20-50 start-ups at a time, such that the size of such application dataset, if available, may also be limited. In addition, anecdotal evidence suggests that the process of raising external equity in the PE-VC industry is informal and does not necessarily involve a formal application. PE-VC firms usually use their network to find start-ups to back (Howell and Nanda, 2019).

⁸Regarding alternative funding sources available to start-ups, I do not find consistent evidence of a gender funding gap within and across sectors. Male and female-led start-ups are equally likely to raise bank debt and access governmental program subsidies in both male-dominated and female-dominated sectors. In addition, female entrepreneurs are more likely to use household debt for their venture. However, I find that equity-backed start-ups and those that use household debt are not the same (Bellucci, Borisov and Zazzaro, 2010; Alesina, Lotti and Mistrulli, 2013). The specific features of external equity financing relative to bank debt regarding selection and monitoring effects can explain why equity investors tend to pay more attention to the entrepreneurs' profiles, especially at an early stage, relative to other types of fund providers (Winton and Yerramilli, 2008; Huang and Pearce, 2015; Gompers et al., 2020).

⁹This intuition is also present in Shaffer (1996) for the lending market: "It is possible for a profit-maximizing (and therefore economically nondiscriminatory) lending policy to generate lower average default rates among minority borrowers than among majority borrowers. These results demonstrate that policymakers and regulatory

The evidence shows that start-ups backed with equity in gender-incongruent sectors outperform. Female-led start-ups in a male-dominated sector hire more employees, sell more abroad, have a more productive use of assets and are more likely to exit by IPO than either male-led start-ups in gender-incongruent sectors or female-led start-ups in gender-congruent sectors. This is also true for male entrepreneurs in female-dominated sectors. The better performance of the minority group in gender-incongruent sectors suggests that requirements for funding of entrepreneurs who are minority were set higher at the selection stage.

To interpret the evidence, I propose a simple model with Bayesian belief updating. Entrepreneurs of male or female gender start in sectors characterized by different gender representations. Investors make investment decisions based on signals they observe about entrepreneurs' unobservable abilities. Investors are rational when they select entrepreneurs according to the true average abilities of their gender group in the sector (statistical discrimination, Phelps et al., 1972; Arrow, 1973). Investors are biased against a gender group if they systematically apply higher standards to this group. Thus, entrepreneurs of that gender end up being systematically underfunded regardless of the sector of activity or their abilities (taste-based discrimination, Becker, 1957). Finally, investors display a form of miscalibrated belief, called *context-dependent stereotypes*, wherein their investment decisions favor entrepreneurs in gender-congruent sectors (Coffman, 2014; Bordalo et al., 2016, 2019; Bohren, Imas and Rosenberg, 2019; Bohren et al., 2020). According to this benchmark, the average abilities of entrepreneurs are overestimated when they belong to the dominant gender group and underestimated when they belong to the minority group.¹⁰ As a result, entrepreneurs are more likely to be funded in gender-congruent sectors. However, conditionally on being funded in gender-incongruent sectors, minority entrepreneurs should outperform. Even though several sources of discrimination may coexist, the pattern I find in the data is consistent with investors who have stereotypes.

An alternative interpretation is related to the self-selection of entrepreneurs into gender-congruent sectors (Akerlof and Kranton, 2000). Because, they may derive utility from behaving according to social prescriptions, the pool of entrepreneurs in gender-congruent sectors would be of worse quality than the pool of entrepreneurs in gender-incongruent sectors. Consistent with this idea, I find that serial and innovative female entrepreneurs are more likely to opt for a male-dominated sector, whereas those who start to enjoy the private benefits of being their own boss are more likely to start in a female-dominated sector. However, when I focus on the

agencies must consider recovery rates in order to understand whether a particular pattern of default rates may imply discriminatory lending behavior.”

¹⁰Davies, Van Wesep and Waters (2019) show that asymmetric effort toward the learning abilities of entrepreneurs can generate miscalibrated beliefs that are also context-dependent.

subsample of entrepreneurs who successfully raised external equity, these differences disappear (Kumar, 2010; Adams and Funk, 2012; Adams and Ragunathan, 2017).¹¹ This finding suggests that entrepreneurs who belong to the minority group and who meet requirements for funding are not necessarily different, at least on observables, from those who are also selected in gender-congruent sectors.

Screening discrimination could also be consistent with the better performance of the minority group in gender-incongruent sectors (Cornell and Welch, 1996). According to this view, female investors would be better at selecting and advising female entrepreneurs.¹² I test the “homophily” hypothesis using extracts of PE and VC deals from VentureXpert, which contain the investment firm’s identity that can be linked to the employer payrolls database to identify the gender of investment firms’ CEOs and managers. I do not find that female investors are significantly more likely to initiate deals in female-dominated sectors and with female-led start-ups. One caveat is that only 9% of PE and VC investment firms are run by a female CEO (Gompers et al., 2014; Gompers and Wang, 2017b). In addition, I investigate the effect of investors’ experience and I find that investors who have already invested in start-ups with founders belonging to the minority group are more likely to invest again in minority-led start-ups.

Taken together, my findings suggest that the *average* investor misses valuable investment opportunities by overlooking minority entrepreneurs in gender-incongruent sectors. The evidence has important implications from the perspective of entrepreneurs, the VC industry, and the economy in general. First, entrepreneur’s access to external equity financing can make the difference between success and failure, given the advantage of these equity investors in advising start-ups and creating value (e.g., Kaplan and Strömberg, 2003; Kaplan and Lerner, 2010; Puri and Zarutskie, 2012). Second, not financing the potential success of high-growth oriented entrepreneurs means that some VCs are deteriorating potentially better performance and are wasting the resources invested by their limited partners (e.g., Gompers and Lerner, 1999; Kaplan and Schoar, 2005). Third, failing to finance minority-led start-ups may ultimately result in missed growth and missed job creation in the economy (e.g., Haltiwanger, Jarmin and Miranda, 2013; Hsieh et al., 2019).

My paper is primarily related to a small but growing literature documenting a gender gap in the financing high-growth oriented entrepreneurs. The prior work has focused more on ho-

¹¹Kumar (2010) finds that female financial analysts perform better than their male counterparts, suggesting that women who self-select into male-dominated occupations are not representative of the population. Adams and Funk (2012) and Adams and Ragunathan (2017) argue that women who sit on boards and reach top corporate positions are not necessarily different from men in those positions.

¹²This explanation is similar to what Fisman, Paravisini and Vig (2017) and Jannati et al. (2018) call in-group bias and what Gompers et al. (2014) and Gompers and Wang (2017b) identify as homophily.

mophily and network effects (Becker-Blease and Sohl, 2007; Gompers and Wang, 2017^{a,b}; Raina, 2019; Ewens and Townsend, 2019; Gornall and Strebulaev, 2019; Howell and Nanda, 2019). In particular, Ewens and Townsend (2019) and Raina (2019) find that female entrepreneurs seeking capital are less likely to be targeted by equity investors and perform worse conditional upon being VC-backed, respectively, but the effects disappear when female-led start-ups are targeted and advised by female investors.¹³ Even though several explanations may coexist for the gender funding gap in high growth entrepreneurship, my findings are consistent with investors having context-dependent stereotypes. Entrepreneurs, both male and female, are less likely to receive external equity in gender-*incongruent* sectors. However, conditional on being backed with equity, minority entrepreneurs outperform.

To highlight the effects of context-dependent stereotypes in the financing of entrepreneurs, I closely follow hypotheses developed in experimental studies and the methodologies of existing field studies on the topic. Lab experiments show that stereotypes work against women especially in male-typed domains not because of preferences for gender but because of beliefs (Shurchkov, 2012; Reuben, Sapienza and Zingales, 2014; Coffman, 2014; Bordalo et al., 2019; Coffman, Exley and Niederle, 2020). In the field, consistent with Becker (1993)'s idea of an outcome test, several studies find evidence in line with the minority group outperforming the majority group: in the lending market (Ferguson and Peters, 1995; Shaffer, 1996), among equity analysts (Kumar, 2010), in the mutual fund industry (Kumar, Niessen-Ruenzi and Spalt, 2015; Chuprinin and Sosyura, 2018), in the bail market (Arnold, Dobbie and Yang, 2018), in a math internet forum (Bohren, Imas and Rosenberg, 2019), and in economics publications (Card et al., 2019). In my setting, I also show that the minority group outperforms in gender-*incongruent* sectors.

More broadly, this paper is related to the economic literature that investigates the origins of the gender gap and a more recent stream of literature in finance that focuses on labor market outcomes of executives and other high-skill workers (Barber and Odean, 2001; Bertrand and Hallock, 2001; Adams and Ferreira, 2009; Bertrand, Goldin and Katz, 2010; Matsa and Miller, 2011; Niessen-Ruenzi and Ruenzi, 2018; Huang and Kisgen, 2013; Tate and Yang, 2015; Fang and Huang, 2017; Azmat and Ferrer, 2017; Adams and Funk, 2012; Adams and Ragunathan, 2017; Keloharju, Knüpfer and Tåg, 2019; Duchin, Simutin and Sosyura, 2019; Egan, Matvos and Seru, 2019; Sarsons, 2019; Bennedsen et al., 2019; Davies, Van Wesep and Waters, 2019).

¹³In an audit study, Gornall and Strebulaev (2019) show that VCs are more likely to reply to “cold” pitch emails sent by female founders than to those by male founders. This surprising finding could be rationalized by networking frictions highlighted by Howell and Nanda (2019). Video-based studies show that investors react more positively to ventures pitched by male entrepreneurs (Balachandra et al., 2019; Brooks et al., 2014; Ma and Hu, 2020).

2. What Explains the Gender Funding Gap?

In this section, I consider a simple model that derives empirical predictions to identify the underlying factors driving the observed gender funding gap. The model builds on Bohren, Imas and Rosenberg (2019) and compares different explanations for discrimination, including stereotyping (Bordalo et al., 2016; Bohren et al., 2020). The framework consists of an investor who learns about an entrepreneur's ability from her gender and sector of activity and then uses this information to decide whether to back her with equity.

2.1. Set-up

Entrepreneurs. Consider an entrepreneur i of gender $g \in \{M, F\}$ who starts a business in sector k . The entrepreneur has an unobservable ability for starting a business in sector k , $a_{ik} \sim \mathcal{N}(\mu_{gk}, \frac{1}{\tau_{a_{ik}}})$, with mean μ_{gk} that is gender and sector specific and an individual precision that can vary by sector, $\tau_{a_{ik}} > 0$.

Investors. Each period, a set of investors evaluates the entrepreneurs' performance. I assume that there is one investor or a homogeneous set of investors in sector k . The investor only observes a noisy signal about the entrepreneur's ability in sector k : $s_i = a_{ik} + \varepsilon_i$, where a_{ik} is the unobservable ability of entrepreneur i in sector k , and $\varepsilon_i \sim \mathcal{N}(0, \frac{1}{\tau_{\varepsilon_i}})$ is an idiosyncratic ability shock with precision $\tau_{\varepsilon_i} > 1$. The signal of an entrepreneur's ability is normally distributed, $s_i \sim \mathcal{N}(\hat{\mu}_{gk}, \frac{1}{\tau_s})$, where $\tau_s = \frac{\tau_a \tau_\varepsilon}{\tau_a + \tau_\varepsilon}$.

The investor makes his evaluation ν_i about entrepreneur i based on his subjective prior beliefs about the average ability of a gender in a sector $\hat{\mu}_{gk}$ and/or preferences about gender S_{gk} . The investor maximizes his expected payoff $-(\nu - (s - S))^2$ from reporting evaluation ν of an entrepreneur of gender g performing in industry k :

$$\nu_i = E[a_i - S_{gk} | s_i, \hat{\mu}_{gk}] = \hat{\mu}_{gk} - S_{gk}$$

If the evaluation is positive, in other words, if the signal is sufficiently large, such that $s_i > S_{gk}$, the investor funds the entrepreneur.¹⁴ Then, the investor uses this information to update his beliefs regarding the abilities of entrepreneurs of gender g in sector k .

¹⁴For simplicity, I assume that the investor funds every entrepreneur who exceeds the threshold. Note that the threshold S_{gk} is exogenously determined. For instance it corresponds to the gender norm in the industry.

Gender gap. The gender gap $G(k)$ is the difference between male and female entrepreneurs' evaluations in sector k and can be written as follows:

$$G(k) \equiv \nu(M, k) - \nu(F, k) = \hat{\mu}_{Mk} - \hat{\mu}_{Fk} - S_{Mk} + S_{Fk}$$

There is a gender funding gap against female entrepreneurs in sector k if $G(k) > 0$. A gender gap against male entrepreneurs in sector k is also possible if $G(k) < 0$. The gender gap against female entrepreneurs can be driven by two different sources of discrimination. First, male entrepreneurs may have to meet lower standards than female entrepreneurs, such that $S_{Mk} < S_{Fk}$ (taste-based discrimination). Second, investor's prior beliefs about the average ability of male entrepreneurs in k are higher than prior beliefs about the average ability of female entrepreneurs, such that $\hat{\mu}_{Mk} > \hat{\mu}_{Fk}$ (belief-based discrimination).

2.2. Case 1: Rational beliefs about gender

I first consider the case where male and female entrepreneurs are held to the same standard, such that $S_{Fk} = S_{Mk} = S_k^*$, and investors have unbiased beliefs about abilities by gender, such that $\hat{\mu}_{gk} = \mu_{gk}$. Thus, the funding condition in sector k is: $\mu_{gk} > S_k^*$.

However, this funding condition is not inconsistent with observing a gender funding gap. If the investor aims to maximize profit and has unbiased beliefs about gender, a potential reason for observing a gender funding gap is statistical discrimination.

Proposition 1 (Statistical discrimination). *If investors beliefs about gender are unbiased, $\hat{\mu}_{gk} = \mu_{gk}$, and if entrepreneurs are held to the same standard, such that $S_{Fk} = S_{Mk} = S_k^*$, then entrepreneur average abilities by gender group are not different conditional on being selected such that $E[a_i|s_i > S_k^*, F] = E[a_i|s_i > S_k^*, M]$.*

Under statistical discrimination, entrepreneurs are selected according to the true average abilities of their gender group, such that no systematic mistake is made against a specific gender group. This does not imply that funding mistakes cannot exist at the individual level. Nevertheless, mistakes are not systematically directed toward the same gender and are expected to cancel out when aggregated. Besides, this finding does not necessarily imply that female entrepreneurs have lower abilities than male entrepreneurs in every sector. For instance, female entrepreneurs may be less able in sector k and more able than male entrepreneurs in sector $-k$.

An alternative potential reason for observing a gender funding gap against female entrepreneurs under these conditions is that female entrepreneurs may appear riskier than that of

male entrepreneurs. In other words, the precision with which their ability is evaluated in sector k may be lower relative to that of male entrepreneurs, such that $E[\frac{1}{\tau_{a_{ik}}}|F, k] < E[\frac{1}{\tau_{a_{ik}}}|M, k] \iff E[\tau_{a_{ik}}|F, k] > E[\tau_{a_{ik}}|M, k]$. In this case, female entrepreneurs may be less likely to be funded not because they have a lower average ability but because their ability is more difficult to evaluate. One rational for this argument is that investors may have less history for female entrepreneurs.

2.3. Case 2: Preferences and miscalibrated beliefs

Investor biases could also drive the observed gender funding gap. An investor is biased toward a gender if she favors this gender either through preferences, which we refer as taste-based discrimination, or through biased prior beliefs about average abilities, which we refer to as discrimination with miscalibrated beliefs, of which stereotyping is one possible form (Bohren, Imas and Rosenberg, 2019; Bohren et al., 2020).

Taste-based discrimination Taste-based discrimination against female entrepreneurs corresponds to the case in which male entrepreneurs are held to a lower standard than female entrepreneurs, such that $S_{Mk} < S_{Fk}$. In this case, a female entrepreneur raises capital if $s_i > S_{Fk}$, whereas a male entrepreneur j raises capital $s_j > S_{Mk}$. A female entrepreneur needs to produce a stronger signal (or a more precise signal) than male entrepreneurs to raise capital. As a consequence, the true average abilities of selected female entrepreneurs is higher than those of selected male entrepreneurs.

Proposition 2 (Taste-Based discrimination). *If investors hold male entrepreneurs to a lower standard than female advisers if $S_{Mk} < S_{Fk}$, then female entrepreneurs' average abilities in sector k are higher than male entrepreneurs' average abilities conditional on being selected, such that $E[a_i|s_i > S_{Fk}, F] > E[a_i|s_i > S_{Mk}, M]$.*

Discrimination with miscalibrated beliefs Under this benchmark, male and female entrepreneurs are held to the same standard and the investor selects entrepreneurs with respect to prior beliefs. However, under this benchmark, prior beliefs do not coincide with the true average ability by gender group. To be funded, both male and female entrepreneurs need to produce a signal above the standard. Even if an investor has miscalibrated prior beliefs, a male and a female entrepreneur who generate the same signal receive identical evaluations, and ultimately reach the same funding outcomes. However, if, for example, the investor underestimates the ability of female entrepreneurs, producing this signal is easier for a male entrepreneur than for

a female entrepreneur. As a consequence, we can expect the true average abilities of female entrepreneurs who manage to be selected to be higher than those of male entrepreneurs.

Proposition 3 (Discrimination with Miscalibrated Beliefs). *If investors have miscalibrated beliefs about gender, such that $\hat{\mu}_{gk} \neq \mu_{gk}$, for example, prior beliefs about female entrepreneurs' average ability in sector k are underestimated $\hat{\mu}_{Fk} > \mu_{Fk}$, and for example, prior beliefs about male entrepreneurs' average ability in sector k are correctly assessed $\hat{\mu}_{Mk} = \mu_{Mk}$; then, female entrepreneurs' true average ability is higher than that of male entrepreneurs conditional on being selected, such that $E[a_i | s_i > S_k^*, F] > E[a_i | s_i > S_k^*, M]$.*

Within sector, taste-based discrimination and miscalibrated beliefs yield the same predictions. Therefore, it is not possible to identify the source of discrimination within a single sector. Only a richer cross-section of sectors can.

2.4. Context-dependent stereotypes

One possible microfoundation for investors who have miscalibrated beliefs is related to context-dependent stereotypes. Under this benchmark, the investor overestimates the average ability of the dominant group and underestimates the average ability of the minority group (Bordalo et al., 2016).

An investor has stereotypical beliefs about the abilities of entrepreneurs of gender g in sector k , such that $\hat{\mu}_{gk} = \mu_{gk}^\theta$, with θ the gender representativeness of the sector defined by the likelihood ratio $\frac{\pi_{g,k}}{\pi_{g,-k}}$ as in Gennaioli and Shleifer (2010); $\pi_{g,k}$ and $\pi_{g,-k}$ are the frequencies of entrepreneurs with gender g in sectors k and $-k$, respectively; and the function μ^θ is a symmetric function centered on the representativeness of a gender to a sector; it increases in its own representativeness and decreases in the representativeness of the other gender.

Under this formulation, stereotypical beliefs about average abilities are modeled as an exaggeration of true gender ability distributions. If gender g is objectively more likely, then investors map the distribution of types to the distribution of abilities by type. Thus, context-dependent stereotypes imply that the investor overestimates the abilities of entrepreneurs in gender-congruent sectors, and underestimates the abilities of entrepreneurs in gender-incongruent sectors. As sectors may have a different dominant gender, stereotypical beliefs may be distorted in favor of one gender or the other. Indeed, it is possible that the investor overestimates the abilities of female entrepreneurs in female-dominated sectors and underestimates their abilities in male-dominated sectors. Similarly, the abilities of male entrepreneurs in a female-dominated sectors are underestimated, whereas they are overestimated in a male dominated sector. Thus,

all else being equal, we should observe entrepreneurs to raise more capital in gender-congruent sectors and less in gender-incongruent sectors.

Proposition 4 (Discrimination with stereotypes). *If investors have stereotypical beliefs about gender, such that $\hat{\mu}_{gk} = \mu_{gk}^\theta$, and if male is the dominant gender of sector k_M and female is the dominant gender of sector k_F , then:*

$$E[a_i | s_i > S_{k_F}^*, M, k_F] > E[a_i | s_i > S_{k_M}^*, M, k_M]$$

with $\mu_{Mk_M}^\theta > \mu_{Mk_M}$ and $\mu_{Mk_F}^\theta < \mu_{Mk_F}$, since $\theta \equiv \frac{\pi_{M,k_M}}{\pi_{M,k_F}} > 1$.

and

$$E[a_i | s_i > S_{k_M}^*, F, k_M] > E[a_i | s_i > S_{k_F}^*, F, k_F]$$

with $\mu_{Fk_F}^\theta > \mu_{Fk_F}$ and $\mu_{Fk_M}^\theta < \mu_{Fk_M}$, since $\theta \equiv \frac{\pi_{Fk_F}}{\pi_{Fk_M}} > 1$.

Proposition 4 predicts that conditional on being selected, the minority group outperforms in gender-incongruent sectors. Thus, female entrepreneurs in male-dominated sectors should outperform female entrepreneurs in female-dominated sectors. Similarly, male entrepreneurs in female-dominated sectors should outperform male entrepreneurs in male-dominated sectors. Predictions within sector can also be generated if we define representativeness as the relative likelihood ratio of a gender relative to the other within a sector.¹⁵

3. Data and Empirical Strategy

3.1. Data sources

My dataset consists of the merging of the SINE survey with corporate tax files available from the French Bureau of Statistics (Insee).

Survey of entrepreneurs. The *Système d'Information des Nouvelles Entreprises* (SINE) survey is a large-scale survey of entrepreneurs conducted by the French Bureau of Statistics every four years. Questionnaires are sent to approximately 25% of entrepreneurs who started or

¹⁵If we define representativeness as the relative likelihood ratio of a gender relative to the other within a sector k , such that $\frac{\pi_{Mk}}{\pi_{Fk}}$, we can also generate the following predictions about distorted gender abilities within a sector: if male is the dominant gender of sector k_M and female is the dominant gender of sector k_F , such that $\frac{\pi_{Mk_M}}{\pi_{Fk_M}} > 1$ and $\frac{\pi_{Mk_F}}{\pi_{Fk_F}} < 1$, then we obtain:

$E[a_i | s_i > S_{k_M}^*, F, k_M] > E[a_i | s_i > S_{k_M}^*, M, k_M]$ in sector k_M , with $\mu_{Mk_M}^\theta > \mu_{Mk_M}$ and $\mu_{Fk_M}^\theta < \mu_{Fk_M}$, and $E[a_i | s_i > S_{k_F}^*, F, k_F] < E[a_i | s_i > S_{k_F}^*, M, k_F]$ in sector k_F , with $\mu_{Fk_F}^\theta > \mu_{Fk_F}$ and $\mu_{Mk_F}^\theta < \mu_{Mk_F}$.

took over a business in France in 2002, 2006, 2010, and 2014 (cohorts). The surveyed firms are randomly selected from firm registries. The response rate to the SINE survey is high (approximately 90%) because the tax authorities supervise the sending of questionnaires. The business owner is responsible for completing the documents.¹⁶ To study real start-ups, new entrepreneurs who inherited or took over an existing business are excluded from the sample. Hence, the dataset consists of a repeated cross-section of 30,000 to 50,000 firms per cohort, that are then matched to the corporate tax files.

Entrepreneurs report during their first year of operation the financing sources they rely upon.¹⁷ The answers are non-mutually exclusive: An entrepreneur can rely on external financing sources in addition to personal resources invested in creation. External financing sources are divided into debt and equity. Debt comprises *Household debt*, *Bank debt* and *Non-bank debt*. *External equity* encompasses *VC* and business equity.¹⁸ *Subsidies* is a very heterogeneous class that includes equity stipends from various public programs.

Gender, age, and citizenship dummy variables are collected from the SINE survey. Education information is recoded such that cohorts can be compared over time. Education dummy variables include *No degree*, *High school*, *Bachelor's*, *Master's/PhD*, and *Elite engineering school*. Additionally, entrepreneurs are asked about the number of years they have worked in the industry and the number of start-ups they have founded. I code a dummy *Expert* if the entrepreneur reports at least three years of industry experience. The dummy variable *Serial* indicates whether the entrepreneur had founded a start-up before the one targeted by the questionnaire.

In the survey, entrepreneurs are asked about their motivations for founding a start-up and their desire to grow the founded start-up. I identify an entrepreneur as *High-growth oriented* if he aims “to develop the company” as opposed “to create his own job”. In a separate question, entrepreneurs report up to three of their main motivations for founding a start-up among the following propositions: *Add earnings* to the household; desire for *Independence*; address unemployment; follow a *Taste* for entrepreneurship and new challenges; take on an *Opportunity*; and explore a *New idea* for a product, service, or market. Entrepreneurs are also asked about their future expectations. I replicate Landier and Thesmar (2008)’s measure of *Optimism*, which is the difference between initial employment expectations (“Do you plan to hire over the next 12

¹⁶More information about these data sources: www.insee.fr/sine and www.cnis.fr/sine. See also Landier and Thesmar (2008); Hombert et al. (2019) for other use of the data.

¹⁷For external equity financing, I compare self-reported access to external equity investors in the SINE survey to PE deals (VC, other PE, CVC and angel investors) reported in VentureXpert. I observe a high correspondence between the matched firms in the two datasets.

¹⁸*VC* and business equity provisions are pooled because they both involve a high degree of target selection and shareholder activism. In addition, a distinction between these two types of external equity is only possible in the 2002 cohort and from the 2010 cohort onward.

months?") and the actual realization in the following year.

Tax files. *Bénéfices Industriels et Commerciaux* and *Bénéfices Non-commerciaux* augmented by employer payrolls (*Déclarations Annuelles des Données Sociales*) provide detailed yearly accounting (balance sheet and income statements) and employment information at the firm level between 2002 and 2016. The tax files cover all firms subject to either the regular corporate tax regime or the simplified corporate tax regime.¹⁹ From the tax files, I retrieve sales, employment size, total assets, earnings before interest and tax (EBIT) and net income. Location (county level) and industrial activity (4-digit SIC level) are also collected from the tax files.²⁰

Investors' characteristics. To retrieve additional investor characteristics, I use the commercial database Thomson VentureXpert merged with the tax files and employer payrolls. VentureXpert contains information on PE deals, including VC, unspecified PE, corporate venture capital (CVC) deals, leveraged buyout (LBO) deals, and financing by angel investors. I discard LBOs that usually target more mature companies.²¹ I identify firms in the tax files as PE-VC-backed if they can be matched to the extracts of VentureXpert, which identifies firms that receive a first round of PE or VC financing between January 2002 and December 2016.

VentureXpert provides the identity of the PE-VC investment firm which can also be linked to the tax files and employer payrolls.²² I identify the gender of the investment firm's CEO using an occupation code available in the employer payrolls. Investor's *experience* in minority-led start-ups is a dummy variable that takes the value one if the investor has had at least one female-led start-up in the portfolio the year before investing in a given start-up.

3.2. Empirical Strategy

The aim of the empirical analysis is to quantify the gender funding gap and to identify potential sources of discrimination.

¹⁹Small firms with annual sales below €32,600 (€81,500 in retail and wholesale trade) can opt out and choose a special micro-business tax regime (called *micro-entreprise*). Income falling into this category is taxed at the personal level. These firms do not, therefore, appear in the corporate tax files (Aghion et al., 2017).

²⁰France is divided into 101 counties (*départements*). The French SIC is the *Nomenclature des Activités Françaises* (NAF) and consists of 540 sectors at the 4-digit level. A major change in the French SIC occurred in 2008 (NAF rev.2) and necessitates the following adjustments to preserve the industry panel structure of the data. In the tax files, the SIC codes before 2008 are given in the old classification. I retrieve the SIC codes of firms before 2008 from the retropolated firm registries and use the most likely correspondence between the two classifications if not available in the firm registries.

²¹I also exclude companies with missing names or addresses because they cannot be matched to French administrative data. The matching between commercial databases and the universe of French administrative data relies on a Python web-crawler. See appendix B for further details.

²²The identity of the investor is often not available for angel investors or refers to an individual who cannot be linked to the employer payroll or tax files.

Gender gap within sector. I start by comparing male- and female-led start-ups' funding outcomes within sector. The empirical specification is given by the following equation:

$$Funded_i = \lambda_z + \lambda_{kt} + \delta Female_i + \beta' X_i + \varepsilon_i \quad (1)$$

where $Funded_i$ is a dummy variable that takes the value one if the start-up i incorporated in sector k and county z and belonging to cohort-year t is funded, zero otherwise; λ_z and λ_{kt} correspond to zip code and sector \times cohort fixed effects, respectively; and X_i represents a vector of additional entrepreneur and start-up characteristics. X_i comprises the start-up's incorporation status, the logarithm of total assets, the ratio of tangible assets, and the biographical characteristics of the entrepreneur, such as age, French citizenship, education and work experience dummy variables.²³ All variables are defined in table 1.

The main independent variable is the dummy $Female$, which captures the founder's gender. This model controls for fixed characteristics across sectors and locations. In particular, it accounts not only for the fact that entrepreneurs with specific abilities may cluster in certain sectors and geographies but also for the fact that investors specialize in specific sectors and select start-ups in their local area.²⁴ A $\delta < 0$ implies the existence of a gender funding gap. However, comparing males and females within a sector does not allow the identification of potential sources of discrimination.

Gender gap across sector. I specify a second test that compares entrepreneurs' funding outcomes across gender-dominated sectors and that is given by the following equation:

$$\begin{aligned} Funded_i = & \lambda_z + \lambda_k + \lambda_t + \delta_1 Female_i + \delta_2 Female - dominated - Sector_t \\ & + \delta_3 Female_i \times Female - dominated - Sector_t + \beta' X_i + \gamma' Z_{kt} + \varepsilon_i \end{aligned} \quad (2)$$

where $Female-dominated Sector_t$ is defined at the 4-digit SIC level and takes the value one if

²³The incorporation status accounts for the fact that entrepreneurship aggregates different types of activities and individuals, making little distinction between high-growth oriented entrepreneurs and survival entrepreneurs (Levine and Rubinstein, 2017).

²⁴Note that the ideal empirical specification would be to introduce entrepreneur fixed effects to capture unobservable individual ability. Such a specification would require several observations of the same entrepreneur's funding outcomes, i.e., serial entrepreneurs or successive applications, as well as variations in the founder's gender within the start-up over time. Nevertheless, a few cases of serial entrepreneurs occur in my sample, and in the case of new ventures, the founders' gender does not usually vary within firm in the first years after creation. As a result, the empirical analysis needs to build on assumptions regarding the sources of variation in entrepreneurs' abilities.

at least 50% of start-ups within a sector-year are female-led, and zero otherwise.²⁵ I introduce additional time-varying sector control variables Z_{kt} , including the sector size, the Herfindahl index, and the frequency of female entrepreneurs within a sector. The percentage of female entrepreneurs controls for the mechanical relationship that could exist between the frequency of female entrepreneurs and their funding outcomes.

The taste-based discrimination view against female entrepreneurs predicts that female entrepreneurs are systematically underfunded in every sector, such that $\delta_1 < 0$ and $\delta_3 < 0$.²⁶ The belief-based view allows for asymmetric funding outcomes by gender across sectors. Female-led start-ups in female-dominated sectors (gender-congruent) could be more likely to raise capital than male entrepreneurs and than female entrepreneurs in male-dominated sectors (gender-incongruent), such that $\delta_3 > 0$, $\delta_2 < 0$ and $\delta_1 < 0$. Specifically, $\delta_3 > 0$ implies that the marginal effect of being a female entrepreneur in a female-dominated sector on the likelihood of raising external equity is positive.

Omitted variables. Equations 1 and 2 implicitly assume that conditioning on the controls X_i perfectly accounts for gender differences in abilities. To some extent they do. However, it is possible that omitted variables drive the results. My answer to this argument is threefold.

First, I control for a large range of individual characteristics and personality traits (X_i) arguably correlated with individual ability (a_i). In the baseline models, I control for education, industry expertise and entrepreneurial experience. In further robustness tests, thanks to the uniqueness of the SINE survey, I can control for individual characteristics not commonly available in other datasets. Specifically, entrepreneurs are asked about their ex-ante motivation for creating a start-up (desire for independence, opportunity, taste and new ideas). Entrepreneurs are also asked at the time of founding if they intend to grow the start-up or remain small (high-growth oriented entrepreneurs). Behavioral traits such as overconfidence, as well as family and team composition, may also be related to entrepreneurial ability. However, it is still possible that entrepreneurs who belong to the minority or the majority groups are different in unobservable dimensions.

²⁵The baseline measure is based on newly created firms available in the SINE survey. For robustness, I construct other measures of female-dominated sectors. They are defined based on the within-sector percentages of female CEOs, female workers, female business owners and new female business owners at newly created firms. The percentages of female CEOs and female workers are retrieved from the employer payroll database, whereas the percentages of female business owners come from the firm registries. In further robustness tests, I replace the 50% threshold with 45% and 55% thresholds, I exclude sectors with between 45% and 55% of female entrepreneurs, and I exclude sectors that switch from one gender to another. The list of those sectors that switch from one gender to another is provided in appendix table A2.

²⁶Note that the taste-based discrimination view does not give any clear prediction for the sign of δ_2 , as the negative relationship between being female and funding outcomes is already captured by δ_1 .

Second, in the spirit of Becker (1993), I design an “outcome test”. The idea is to test whether founders by gender group and sector perform differently conditional on receiving external equity.²⁷ If at the selection stage, the bar was set at the correct level, i.e., true average abilities of their gender group (statistical discrimination), we would not observe any systematic differences in performance between the two gender groups. In contrast, if one group has been favored by investors, this group should underperform relative to the other group, under the assumption that entrepreneurs’ abilities are constant over time .

Empirically, I regress the interaction between the entrepreneur’s gender and the gender dominance of the sector on measures of start-ups’ future growth and performance. I highlight the gender-congruent effect by comparing the performance of *Female*-led start-ups that are funded in *Male-dominated sectors* with male-led start-ups within the sector and female-led start-ups in female-dominated sectors.

$$\begin{aligned} Outcome_{it}|Funded_i = & \lambda_z + \lambda_k + \lambda_t + \delta_1 Female_i + \delta_2 Male.Sector_t \\ & + \delta_3 Female_i \times Male.Sector_t + \beta' X_{it} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

where $Outcome_{i,t}$ corresponds to the start-ups’ future performance up to five years after creation conditional on being funded by an equity investor. Statistical discrimination predicts no systematic differences in future performance between genders, such that $\delta_1 = 0$, $\delta_2 = 0$, and $\delta_3 = 0$. The miscalibrated beliefs view predicts that successfully funded female entrepreneurs in male-dominated sectors outperform their male counterparts in these sectors ($\delta_1 + \delta_2 + \delta_3 > 0$, within sector comparison) and outperform female-led start-ups in female-dominated sectors ($\delta_2 + \delta_3 > 0$, across sector comparison).

Third, another concern could be that entrepreneurs by gender may not be randomly distributed across sectors and may instead self-select into sector. In an additional test, I endogenize the choice between a female- versus a male-dominated sector. I regress this choice on the aforementioned individual characteristics interacted with gender for the entire sample of entrepreneurs and then the subsample of entrepreneurs who receive capital. This test captures observable differences in entrepreneurs’ ability by gender across sectors.

²⁷Note that I focus on start-ups backed with equity, as start-ups’ performance is arguably endogenous to being equity-backed, i.e., financing and advising role of equity investors.

4. Descriptive Statistics

4.1. Heterogeneity in the gender gap across sectors

Table 1 Panel B shows that female entrepreneurs lead 26% of the 92,446 new firms in my sample. The gender gap is closing slowly, starting from 23% in 2002 to 28% of female founders in 2014, confirming the existence of a large and persistent gender gap in entrepreneurial participation. Panel B shows that 11% of entrepreneurs sort into female-dominated sectors and 89% sort into male-dominated sectors. Female-dominated sectors attract twice as many women as men, whereas male-dominated sectors involve more than three times as many men as women.

Appendix table A1 shows that female-led start-ups are concentrated in healthcare sectors (62%), educational activities (40%), and service-related sectors (62%). IT and financial services include 18% and 25% female entrepreneurs, respectively. At the 4-digit SIC level, women tend to sort relatively the most in the “hairstyling and other beauty treatment” (77%) and “other human health activities” (70%). By contrast, “forging, pressing, stamping”, the manufacture of “bodies for motor vehicles” and the “repair of electrical equipment” include 3-4% of new female-led start-ups.

[Insert table 1 here]

4.2. Are male and female entrepreneurs different?

Table 2 shows that approximately half of the entrepreneurs are 40 years or older. Female entrepreneurs are, on average, younger and are more likely to be French citizens than male entrepreneurs. Regarding education, the average female founder is more educated than the average male entrepreneur: 34% of male entrepreneurs and 43% of female entrepreneurs hold a bachelor’s degree or a master’s/PhD degree. However, among highly educated entrepreneurs, men are twice as likely to have graduated from an elite engineering school.

Female entrepreneurs have less industry experience and are less likely to have already founded a company. Of male founders, 66% indicate having at least three years of experience in the sector before starting up, while only 53% of female founders do, while 32% of male entrepreneurs have already founded a start-up, whereas only 22% of female entrepreneurs did.

Regarding motivations to create a start-up, female entrepreneurs are more likely to prefer to stay small (75% versus 69% of males). The average entrepreneur’s main motivation is indeed to becoming independent and to a lesser extent, because of a taste for entrepreneurship (45%).

Female entrepreneurs are less likely to indicate that they started a business because they had a taste for entrepreneurship but are more likely to report that they founded their company because of an opportunity or because they wanted to explore a new idea. In addition, female entrepreneurs are less optimistic than male entrepreneurs about their start-up's prospects (22% versus 33%).

Regarding family structure, in my sample, 71% of entrepreneurs are married or in a relationship, and 56% have children. Female entrepreneurs are less likely to be married and more likely to have children than male entrepreneurs. Regarding the composition of the founding team, I find that female and male entrepreneurs are equally likely to start on their own (73%) or on a team with a relative (5%). Female entrepreneurs are more likely to launch a new business with their spouse than men (13% versus 10%) and less likely to start on a team with business associates (11% versus 13%).

[Insert table 2 here]

What makes a female entrepreneur? Consistent with the univariate comparisons, appendix table A3 shows that female entrepreneurs are 5% more likely to have a bachelor's degree and 2% more likely to hold a master's or PhD degree relative to male entrepreneurs in the same cohort who start in the same sector. However, female entrepreneurs are 7% less likely to have significant industry experience and 8% less likely to have already founded a start-up. Female founders are also less likely to start from a desire for independence or taste for entrepreneurship; instead, their entry is driven by perceived opportunities. In columns (3) and (4), I examine these gender differences for equity-backed start-ups only. The effects of education and experience are slightly amplified. Differences regarding motivations are now not different from zero, suggesting that investors select entrepreneurs based on their motivations.

4.3. Are male- and female-led start-ups different?

Table 2 shows that overall 51% of entrepreneurs rely on external financing and that most of them rely on bank debt (Robb and Robinson, 2014). Specifically, 31% of start-ups have bank debt, 13% use household debt, and 10% have non-bank debt. In addition, 3% of the start-ups have external equity financing. Specifically, 1% of male-led start-ups and 0.7% of female-led start-ups are VC-backed. These figures correspond to approximately 1,000 firms that receive VC funding in my sample. External equity financing is arguably an important funding source for start-ups from a qualitative perspective, as investors target start-ups with high growth potential in terms

of employment and revenues.

Regarding start-ups' number of employees size and performance, at the end of the year of creation, 77% of firms do not have any employees, whereas 2.5% of them have 6 or more. Although female entrepreneurs start smaller start-ups on average, the difference is smaller for the top buckets of the employment distribution. The average female-led start-up is also smaller in terms of asset size and has a higher ratio of tangible assets. Considering the unconditional means of performance, new female-led firms are less profitable over the first five years after creation than their male counterparts in terms of sales, EBIT, and ROA. In addition, female-led start-ups are incorporated into larger and more feminized sectors, but their environments are on average not less competitive.

5. Main Results

5.1. Gender funding gap within sectors

I start by comparing female and male-led start-ups' likelihood of using external equity financing within a sector at a given point in time. I control for various observable differences between male and female entrepreneurs' biographical characteristics that are arguably correlated with entrepreneurial abilities. Standard errors are clustered at the 4-digit SIC level. Figure 1 plots the findings, and table 3 reports the results.

[Insert figure 1 here]

I find that female-led start-ups are approximately 18-27% ($= \frac{-0.0055}{0.03}$) less likely to rely on external equity than similar male-led start-ups within the same sector, year, and county (column 1). Column 2 shows that entrepreneurs who hold a master's or a PhD degree are significantly more likely to have access to and use external equity financing relative to those who have not completed any higher education. The results also show that investors value prior entrepreneurial experience. While serial entrepreneurs are 1.3 percentage points more likely to use external equity, entrepreneurs with prior industry experience do not have any significant advantage in this regard. Controlling for education and experience does not fully explain the gender funding gap, which is still 19%. In columns 3 and 4, I focus on VC financing only, and I find robust evidence that female-led start-ups are 23-29% ($= \frac{-0.0029}{0.01}$) less likely to use VC financing.

[Insert table 3 here]

Are female entrepreneurs less likely to demand? A concern with the interpretation above is that one cannot tell with certainty whether female-led start-ups are less likely to use external equity, because their applications were more often rejected or because they never applied. However, my data allow me to observe firms that have not raised external equity but were likely applicants, namely, firms that seek growth and have managed to raise other sources of external financing. In appendix table A5, I restrict the analysis to start-ups whose founders are high-growth oriented or that use other external financing sources including banks loans and equity grants. The results still show that female-led start-ups are less likely to rely on external equity financing. The point estimates are close to those in the main specification if not showing a more severe gender funding gap.

Do female entrepreneurs shift their demand? Table 3 panel B examines the gender funding gap for the alternative financing sources available to start-ups. I find that the founder's gender does not explain the likelihood of using external financing overall (column 1). Specifically, the use of bank debt and subsidies is not different between genders (columns 2 and 4). However, female founders are more likely to rely on household debt for their business than their male counterparts (column 3).²⁸

One possible interpretation of this finding is that female-founders substitute external equity financing with household debt. In appendix table A6, I interact the founder's gender with the use of an alternative financing source. The evidence shows that the use of household debt is orthogonal to the use of external equity (column 2). Moreover, female founders who use household debt are less likely to use also external equity, suggesting that female-led start-ups that rely on household debt are not the same as those that rely on external equity. In addition, although using bank debt and non-bank debt is positively related to external equity financing, female and male founders who use bank debt for their start-ups are equally likely to use external equity. These findings suggest that female founders do not seem to shift their demand to debt.

Does initial capital matter? Another alternative explanation for the gender equity gap relates to the differences in capital invested at creation. Appendix table A7 shows that start-ups backed with equity do not display any significant capital structure differences regarding the share of invested personal resources, the share of debt or other external resources. Appendix table A8 panel A reports the distribution of initially invested capital by gender. The median

²⁸ Interestingly, the results in table 3 panel B show that asset tangibility is an important predictor of the use of debt, whereas it is not significantly related to the use of external equity (panel A). This finding is consistent with the idea that banks focus on the quality of the collateral, in contrast to equity investors, who place greater weight on the entrepreneurs' profile in their decision to invest capital.

founder invests between €8,000 and €16,000 at creation. 10% of founders invest more than €80,000. Panel B shows that female founders are still less likely to rely on external equity financing relative to male founders in the same sector who have invested similar amounts of capital at creation.

5.2. The effect of stereotypes

If the gender funding gap was driven by taste-based discrimination, investors would systematically underfund those female-led start-ups regardless of the sector of activity. In contrast, if investors' beliefs about gender drive the results, then the marginal impact of starting in a gender-congruent sector, i.e., being a woman in a female-typed activity or being a man in a male-typed activity, should be positive. This section tests this hypothesis by interacting the founder's gender with measures of gender-dominated sectors.

The approach consists of identifying sectors in which female founders represent the dominant group. I propose four measures of female-dominated sectors. First, I use the percentage of female founders in the population of newly created firms by sector. The variable representing the female-dominated sector takes the value one if more than 50% of start-ups in the 4-digit SIC are female-led. The second measure is based on the percentage of female business owners in the population of newly created firms; the third is based on the percentage of female business owners in the entire population of firms; and the fourth is based on the percentage of female CEOs identified in the employer payrolls. This set of regressions includes sector, cohort-year and county fixed effects, in addition to the human capital and start-up controls. I also control for time-varying sectoral characteristics, such as size, the Herfindahl index, and the frequency of each gender by industry. Standard errors are clustered at the sector level. Figure 2 plots the unconditional means of fundraising success by gender between male- and female-dominated sector.

[Insert figure 2 here]

Table 4 panel A shows that although female-led start-ups are significantly 23% ($= \frac{-0.0069}{0.03}$) less likely to raise external equity in male-dominated sectors. In female-dominated sectors, they are 3.6% ($= \frac{0.0080-0.0069}{0.03}$) more likely to raise external equity than male-led start-ups.²⁹ Relative

²⁹Appendix table A9 shows that the sum of coefficients is jointly different from zero at the 5% level. Note that this test is performed when standard errors are not clustered. Note further that the coefficient of the variable *Female-dominated sector* is significantly different from zero in columns 1 and 3 when we remove sector fixed effects, suggesting that male-led start-ups in female-dominated sectors are less likely to use external equity financing than male entrepreneurs in male-dominated sectors. This effect becomes identifiable when sector fixed

to female entrepreneurs in male-dominated sectors, female entrepreneurs in female-dominated sectors are 26% ($= \frac{0.008}{0.03}$) more likely to raise external equity. The effect is robust to alternative definitions of gender dominance by sectors.

[Insert table 4 here]

In panel B, I examine funding outcomes for alternative financing sources available to start-ups. As opposed to equity-backed start-ups, I do not find any asymmetric funding outcomes between genders across sectors. Female entrepreneurs do not seem to substitute their financing needs in male-dominated sectors with alternative external financing sources, i.e., bank debt (column 2) and subsidies (column 4).

Investors' asymmetric funding behaviors between genders and across sectors are inconsistent with a pure taste-based discrimination story. In other words, the negative relationship between being female and the use of external equity is not homogeneous across sectors. The evidence shows that start-ups, both male- and female-led are more likely to raise capital in gender-congruent sectors.

5.3. Future corporate outcomes

The next question is whether investors hold rational or biased beliefs about gender (i.e., statistical discrimination versus stereotypes). From the perspective of equity investors, it could be perfectly rational to fund male-led start-ups more often than female-led start-ups in male-dominated sectors if male founders' true average abilities are higher than those of female founders. Similarly, it could be perfectly rational to finance female-led start-ups more in female-dominated sectors if they are simply more able in those sectors. In addition, at the selection stage, simply regressing funding outcomes on founder's gender and other characteristics may suffer from omitted variable bias.

To overcome these challenges, I specify an outcome test that compares the future corporate outcomes of start-ups conditional on having raised external equity. If investors are rational and select entrepreneurs according to the true average abilities of their gender group, we should not observe any systematic gender differences in the future corporate performance of male- and female-led start-ups within or across sectors. In contrast, the miscalibrated beliefs view of gender predicts that in gender-incongruent sectors minority-led start-ups backed with equity should perform better than start-ups that belong to the dominant group, as the bias to being effects are removed. Very few sectors switch from male-dominated to female-dominated, as shown in appendix table A2. The gender composition of sectors is indeed stable over time.

selected in the first place was set higher. Regarding the future corporate performance of start-ups, I consider employment, sales over assets, the percentage of sales realized abroad, ROA and survival measures from one year to the three and five years after creation, as well as measures of successful exits, such as IPOs and M&As.

My results reported in table 5 show that conditional upon being backed with equity, female-led start-ups in male-dominated sectors tend to outperform male-led start-ups in male-dominated sectors (within sector) and female-led start-ups in female-dominated sectors (across sectors). Female-led start-ups employ more employees (column 1), use their assets more efficiently (column 2) and sell more abroad than male-led start-ups in male-dominated sectors (column 3). Female-led start-ups in male-dominated sectors employ 0.7 more employees than male-led start-ups in male-dominated sectors, up to five years after receiving external equity (column 1). Compared to female-led start-ups in female-dominated sectors, they employ 3.7 more employees. Female-led start-ups' use of assets, captured by the ratio of sales over assets, is also more efficient than their male counterparts within male-dominated sectors (column 2).

Two notable exceptions to these findings are the measures of ROA and survival. Female-led start-ups have lower ROA than their male-led counterparts within male-dominated sectors ($0.0505 - 0.0644 < 0$, column 4). However, ROA is a measure of performance that suits more mature firms, as opposed to growth measures that are more suitable for young firms, with unstable profits in the first years of operation (Da Rin, Hellmann and Puri, 2013). In addition, columns 5 and 6 suggest no differences in the likelihood of surviving for at least 3 and 5 years between female and male-led start-ups within and across sectors. Survival can be seen as a combination of first and second-moment of performance, such that it is unclear whether survival is an objective measure targeted by equity investors. Indeed, small businesses may survive longer than a high-growth oriented business because of the low level of risk they undertake.

Finally, I compare male and female founders' likelihood of exiting by IPO or M&A (columns 7 and 8).³⁰ The evidence shows that female-led start-ups are more likely to go public in male-dominated sectors than their male counterparts. However, I do not find any significant difference between male- and female-led start-ups regarding the likelihood of being acquired.

Table 5 panel B examines the performance of male-led start-ups in female-dominated sectors.³¹ The results indicate that male-led start-ups outperform in gender-incongruent sectors

³⁰Exits by IPO or M&A are relatively rare events – there are 101 exits by IPO and 455 exits by M&A in the sample – such that I may not have sufficient within-sector variation to identify significant effects. Hence, the models in columns 7 and 8 do not include sector and cohort-year fixed effects.

³¹Panels A and B estimate the same effects. The report the same R^2 and the same δ_3 coefficients for this reason. They only highlight different minority groups in gender-incongruent sectors: in panel A, females in male-dominated sectors and, in panel B, males in female-dominated sectors. Because a founder's gender and the

along all measures of corporate growth. Specifically, male-led start-ups that received external equity employ 1.5 more employees than similar female-led start-ups in female-dominated sectors (column 1); they utilize their assets more efficiently (column 2) and sell more abroad (column 3) but also have worse ROA (column 4). Finally, the evidence also shows that male-led start-ups in female-dominated sectors have a higher probability of exiting by IPO. However, there are no significant differences in the likelihood of being acquired.

Overall, I show that conditional on being backed with equity entrepreneurs in gender-incongruent sectors outperform compared to those who belong to the dominant group within sector in terms of employment size, efficient use of assets, sales realized abroad and likelihood of going public. In addition, these minority entrepreneurs also perform better within the same gender across sectors where they constitute the dominant group.

[Insert table 5 here]

Are minority groups riskier? One could argue that the better performance of the minority group could just be a compensation for riskier businesses. In other words, the required rate of return on start-ups in gender-incongruent sectors may be higher. One way to interpret the performance results would be to assume that investors are risk neutral. However, I can test the validity of this risk neutrality assumption by considering the volatility of employment size and the volatility of sales from the year of creation to five years thereafter as proxies for a start-up's risk. The results reported in appendix table A11 suggests that minority-led start-ups in gender-incongruent sectors do not display a higher level of risk than start-ups led by entrepreneurs who belong to the dominant group.³²

5.4. Higher bar for minorities or selected pool of entrepreneurs?

In the previous section, I argue that the better performance of start-ups in gender-incongruent sectors is consistent with the idea that the bar is set higher for them at the selection stage. An alternative interpretation relates to self-selection into sectors. Hence, female entrepreneurs who

gender-dominance of a sector of activity are binary variables, the following equalities exist: $Female = 1 - Male$ and $Female-dominated\ sector = 1 - Male-dominated\ sector$. Thus, I could interpret all the results using only one of the two panels. One additional argument in favor of the use of two distinct subsamples is the presence of fixed effects that prevent the constants from being interpreted in these specifications and therefore make economic effects more difficult to calculate.

³²Note that to interpret the results, I need to make additional identifying assumptions. First, I need to assume that abilities are constant over time or that founders who belong to the minority group or to the majority group learn at the same pace. Second and relatedly, for my interpretation to be true, I need to assume that entrepreneurs in gender-incongruent sectors received the same advising or coaching intensity from investors after being selected. In other words, conditional on being selected by investors, I assume that the quality of the match is homogeneous between groups.

self-select into female-dominated sectors would have lower abilities than those who self-select into male-dominated sectors. This could be, for instance, the case if entrepreneurs expect easier career paths or enjoy private benefits from starting in a gender-congruent sector. Table 6 panel A supports this intuition. When examining all entrepreneurs in my sample, I find that female entrepreneurs who self-select into female-dominated sectors are on average of worse quality than those who self-select into male-dominated sectors along several observable dimensions in the data, such as education, experience and motivations.

Panel B focuses on the subsample of entrepreneurs who are funded with external equity. I no longer find any significant differences between entrepreneurs who self-select into either a male- or a female-dominated sector in terms of education in elite engineering schools and prior industry or entrepreneurial experience. Regarding ex-ante motivations for entry into entrepreneurship (new idea, taste, opportunity, independence), successfully funded female entrepreneurs who choose a female-dominated sector do not seem to be significantly different from those who choose a male-dominated sector. However, those female entrepreneurs who start in a male-dominated sector as opposed to a female-dominated sector are more likely to report that they have the ambition to grow and are more likely to have optimistic beliefs regarding their future growth. Overall, the evidence suggests that women who pass the bar of being selected by investors in a male-dominated sector are not *observably* different in terms of prior experience and motivation for entry than those who opted to start in a female-dominated sector.

[Insert table 6 here]

6. Cross-sectional Variations in Entrepreneurs' Profiles

In this section, I test cross-sectional variations in entrepreneurs' human capital, composition of the entrepreneurial teams and motivation to identify conditions under which minority-led start-ups are less at a disadvantage from starting in a gender-incongruent sector. In addition, I show that investors are subject not only to gender stereotypes but also to age stereotypes.

6.1. Human capital

Table 7 shows that female founders who graduated with a master's or PhD degree are more likely to access external equity, although the effect of graduate education is lower than that for men ($0.0106 - 0.0063 = 0.4\%$, column 1). In addition, founders who graduated from an elite engineering school raise external equity more often than those who did not, and especially those

in female-dominated sectors. Graduating from an elite engineering school equally favors male and female founders (column 2).³³

Regarding prior industry and entrepreneurial experience, I find that industry experience is not significantly related to the use of external equity, this finding being consistent across genders and sectors. In contrast, being a serial entrepreneur is positively related to the use of external equity financing for both male and female founders, with the effect being stronger for men (0.0161 percentage points versus 0.0161-0.0029 percentage points for female founders). Overall, the results suggest that human capital measured by higher education and entrepreneurial experience significantly increases the chances of accessing equity financing for both male and female founders, albeit with the effect being more moderate for the latter.

6.2. Team and family

Start-ups led by teams represent 29% of the overall new firms in France. In table 8, I find that team-led start-ups led by a woman are -48% ($= \frac{-0.0145}{0.03}$) less likely to raise external equity than team-founded start-ups led by a man. Stand-alone female entrepreneurs are -15% ($= \frac{-0.0048}{0.03}$) less likely to raise external equity than their male counterparts in male-dominated sectors. In addition, female-led teams and stand-alone female entrepreneurs both benefit from starting in female-dominated sectors, as they seem to be able to partly or fully offset the disadvantage of their gender.

The results in column 3 show that equity financing is not sensitive to gender when spouses start as a team, suggesting that investors seem to value more the presence of men on entrepreneurial teams. In addition, I find that female-led start-ups formed by siblings and by professional associates are less likely to raise capital in both gender-congruent and incongruent sectors than are male-led start-ups with the same composition. Finally, single female founders are approximately three times less likely to raise and use external equity. However, they benefit from starting in a gender-congruent sector.

[Insert table 8 here]

6.3. Motivations and optimism

Female entrepreneurs in gender-congruent sectors may start a company for different reasons than their male counterparts. Table 9 column 1 shows that founders who have the ambition to

³³Note that 6% of male founders and 3% of female founders graduated from one of these schools.

develop their firms are 40% ($= \frac{0.0120}{0.03}$) more likely to raise capital than those who want to create a job for themselves. However, high-growth oriented female founders are 0.0094 percentage points less likely to use external equity than male founders who report the same ambition.

The evidence in columns 2 to 5 shows that a new idea, a taste for entrepreneurship, and the perception of an opportunity are positively and significantly related to external equity financing. Independence as a motivation to found a start-up is negatively associated with external equity financing, but this is marginally more favorably accepted for female founders, with no significant difference across sectors. Finally, male entrepreneurs who hold optimistic beliefs are 28% more likely to rely on external equity financing, whereas the effect is not statistically significant for female entrepreneurs. Overall, the results show that highly motivated male and female founders are more likely to use external equity, albeit with the effect being more moderate for the latter.

[Insert table 9 here]

6.4. The effect of age stereotypes

Investors may hold stereotypes not only about gender but also about other entrepreneur traits such as age (Coffman, Exley and Niederle, 2020).³⁴ In this section, I test the marginal effect of age-incongruent sectors on the likelihood that older entrepreneurs (50 years or older) use external equity financing and alternative financing sources. Young sectors are flagged as sectors in which the median CEO's age is younger than 40 years.

In table 10, I find that older entrepreneur do not raise significantly more equity financing than younger entrepreneurs on average (column 1). However, older entrepreneurs are less likely to raise bank debt, household debt or a subsidy for their start-ups (columns 2, 3 and 4, respectively). In addition and similar to the gender-congruent sector effect, older entrepreneurs are significantly less likely to use to external equity in young-typed sectors (age-incongruent) relative to similarly educated and experienced younger entrepreneurs in those sectors.

[Insert table 10 here]

³⁴I also tested the effect of nationality stereotypes, i.e., being French or not and being European or not, for which I could not find similar results to the gender-congruent and age-congruent cases. One potential explanation is that there is not enough variation in the data, as foreigners never constitute the dominant group of an activity.

7. Further Alternative Explanations

The better performance of the minority-group suggests that the bar was set higher in gender-incongruent sectors. I argue that the evidence is consistent with investors who have context-dependent stereotypes, rooted in miscalibrated beliefs. However, the previous findings could also be consistent with investors who have sector-specific preferences associated with genders. Investors would prefer women for female-dominated sectors and men for male-dominated sectors. I investigate this alternative explanation in two additional tests that exploit heterogeneity in investors' profiles, namely investor's gender and investor's experience.

7.1. Investor gender and homophily

In this section, I test whether the investor's gender is positively related to the entrepreneur's gender and the gender dominance of the sector.³⁵ If investors make investment decisions based on their preferences for gender, I would expect female investors to cluster in female-dominated sectors and to have different preferences for female entrepreneurs than male investors (homophilic preferences).

The results in table 11 show that female investors are not significantly more likely to invest in female-typed sectors. Moreover, female investors in female-dominated sectors do not tend to invest more in female-led start-ups (column 1). The subsequent models rerun the specification by investment type. I consistently find that female investors are not more likely to invest in female-led start-ups, with two notable exceptions. Female investors at VC firms are less likely to invest in female-led start-ups within female-dominated sectors (column 2), whereas female angel investors tend to invest more frequently in female-led firms that operate in a female-dominated sector.

[Insert table 11 here]

Overall, the evidence suggests that the selection of start-ups is not primarily influenced by homophilic preferences. Male and female investors do not seem to behave differently. However, the fact that few investment firms are actually managed by female CEOs (8% of investment firms are female-led in the sample; see Appendix table A12) may not allow sufficient variation on the supply side to identify a significant relationship. Appendix figure A1 plots the evolution

³⁵Note the tests are executed on the sample of VentureXpert deals that allows me to identify both the entrepreneur's and the investor's gender. Therefore detailed individual entrepreneur characteristics available in the SINE survey cannot be introduced in these tests. In addition, note that the specifications do not include sector and year fixed effects because the small sample size does not allow sufficient variation within each category.

of VC and PE investment firms over time and shows that the underrepresentation of PE and VC firms led by a female CEO is fairly stable over time.

7.2. Investor experience and learning

If investors have industry-specific preferences about gender, they should not be willing to learn from their previous investment decisions. In contrast, investors who have miscalibrated beliefs are willing to learn. Hence, investors who invested in minority-led start-ups in the past should be more likely to invest in those start-ups again noticing their good performance in gender-incongruent sectors.

Table 12 shows that investment firms that have already had experience with female-led start-up investing tend to be more likely to invest again in a female-led start-up. Indeed, column 1 displays a positive correlation between the likelihood of investing in a female-led start-up and experience in female start-up investing. Note that the effect is stronger when the female-led start-up operates in a gender-incongruent sector. The effect is mainly driven by PE deals in particular (column 3). Overall, the evidence suggests that investors' decisions are autocorrelated over time and that investors who previously invested in minority-led start-ups, which presumably deliver better performance, continue to do so.

[Insert table 12 here]

8. Conclusion

This paper starts with the fact that female-led start-ups are less likely to raise external equity within and across sectors. Next, I distinguish between male- and female-dominated sectors, and I show that female-led start-ups are more likely to raise capital in gender-congruent sectors, i.e., female-dominated sectors. However, female entrepreneurs in male-dominated sectors are still less likely to use external equity than their male counterparts in gender-incongruent sectors. Start-ups' initial size, asset tangibility, founder's education, experience, ex-ante motivations, optimism and the composition of the founding team do not fully explain the observed gender funding gaps. This finding is inconsistent with taste-based discrimination, which would result in investors systematically underfunding female entrepreneurs regardless of the sector.

To overcome potential omitted variable bias at the selection stage, this finding could be driven by omitted variables. I design an outcome test and compare the future performance by gender group in gender-congruent, incongruent sectors of start-ups conditional on receiving

external equity. The results show that start-ups in gender-incongruent sectors – female-led in male-dominated sectors and male-led in female-dominated sectors – outperform start-ups led by an entrepreneur who belongs to the dominant group of the sector. Gender-incongruent start-ups grow more quickly, use their assets more efficiently, sell more abroad, and are more likely to exit by IPO. The evidence suggests that the bar was set higher for minority-led start-ups at the selection stage.

Although several sources of gender discrimination may coexist, the evidence in this paper is consistent with investors who have *on average* miscalibrated beliefs about gender and behave according to context-dependent stereotypes. This study could help to rationalize policy interventions that aim to increase the participation of minorities in environments in which they are underrepresented, i.e., more female entrepreneurs in male-dominated sectors and more male entrepreneurs in female-dominated sectors. Indeed, a more balanced representation of male and female entrepreneurs in gender unbalanced industrial activities is expected to attenuate the effects of stereotypes.³⁶

³⁶In practice those initiatives can take the form of communication campaigns and mentoring programs targeting minorities (Meier, Niessen-Ruenzi and Ruenzi, 2017; Del Carpio and Guadalupe, 2018). In contrast, quotas and women-only funding programs are more suited to address taste-based discrimination behaviors. Gender board quotas have been introduced in several European countries (among others Ahern and Dittmar, 2012; Matsa and Miller, 2013; Bertrand et al., 2014).

References

- Adams, Renée B, and Daniel Ferreira. 2009. "Women in the boardroom and their impact on governance and performance." *Journal of Financial Economics*, 94(2): 291–309.
- Adams, Renée B, and Patricia Funk. 2012. "Beyond the glass ceiling: Does gender matter?" *Management Science*, 58(2): 219–235.
- Adams, Renée B, and Vanitha Ragunathan. 2017. "Lehman sisters." *Working Paper*.
- Aghion, Philippe, Ufuk Akcigit, Matthieu Lequien, and Stefanie Stantcheva. 2017. "Do entrepreneurship and self-employment respond to simpler fiscal incentives? Evidence from France." *Working Paper*.
- Ahern, Kenneth R, and Amy K Dittmar. 2012. "The changing of the boards: The impact on firm valuation of mandated female board representation." *Quarterly Journal of Economics*, 127(1): 137–197.
- Akerlof, George A, and Rachel E Kranton. 2000. "Economics and identity." *Quarterly Journal of Economics*, 115(3): 715–753.
- Alesina, Alberto F, Francesca Lotti, and Paolo Emilio Mistrulli. 2013. "Do women pay more for credit? Evidence from Italy." *Journal of the European Economic Association*, 11(1): 45–66.
- Arnold, David, Will Dobbie, and Crystal S Yang. 2018. "Racial bias in bail decisions." *Quarterly Journal of Economics*, 133(4): 1885–1932.
- Arrow, Kenneth. 1973. "The theory of discrimination." *Discrimination in Labor Markets*, 3(10): 3–33.
- Azmat, Ghazala, and Rosa Ferrer. 2017. "Gender gaps in performance: Evidence from young lawyers." *Journal of Political Economy*, 125(5): 1306–1355.
- Balachandra, Lakshmi, Tony Briggs, Kim Eddleston, and Candida Brush. 2019. "Don't pitch like a girl! How gender stereotypes influence investor decisions." *Entrepreneurship Theory and Practice*, 43(1): 116–137.
- Barber, Brad M, and Terrance Odean. 2001. "Boys will be boys: Gender, overconfidence, and common stock investment." *Quarterly Journal of Economics*, 116(1): 261–292.
- Becker-Blease, John, and Jeffrey Sohl. 2007. "Do women-owned businesses have equal access to angel capital?" *Journal of Business Venturing*, 22(4): 503–521.
- Becker, Gary S. 1957. "The economics of discrimination." *University of Chicago*.
- Becker, Gary S. 1993. "Nobel lecture: The economic way of looking at behavior." *Journal of Political Economy*, 101(3): 385–409.
- Bellucci, Andrea, Alexander Borisov, and Alberto Zazzaro. 2010. "Does gender matter in bank-firm relationships? Evidence from small business lending." *Journal of Banking & Finance*, 34(12): 2968–2984.
- Bennedsen, Morten, Elena Simintzi, Margarita Tsoutsoura, and Daniel Wolfenzon. 2019. "Do firms respond to gender pay gap transparency?" *Working Paper*.
- Bertrand, Marianne. 2011. "New perspectives on gender." *Handbook of Labor Economics*, 4: 1543–1590.
- Bertrand, Marianne, and Kevin F Hallock. 2001. "The gender gap in top corporate jobs." *ILR Review*, 55(1): 3–21.
- Bertrand, Marianne, and Sendhil Mullainathan. 2004. "Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination." *American Economic Review*, 94(4): 991–1013.

- Bertrand, Marianne, Claudia Goldin, and Lawrence F Katz.** 2010. "Dynamics of the gender gap for young professionals in the financial and corporate sectors." *American Economic Journal: Applied Aconomics*, 2(3): 228–55.
- Bertrand, Marianne, Sandra E Black, Sissel Jensen, and Adriana Lleras-Muney.** 2014. "Breaking the glass ceiling? The effect of board quotas on female labor market outcomes in Norway." *Review of Economic Studies*.
- Bohren, J Aislinn, Alex Imas, and Michael Rosenberg.** 2019. "The dynamics of discrimination: Theory and evidence." *American Economic Review*, 109(10): 3395–3436.
- Bohren, J Aislinn, Kareem Haggag, Alex Imas, and Devin G Pope.** 2020. "Inaccurate statistical discrimination." *Working Paper*.
- Bordalo, Pedro, Katherine Coffman, Nicola Gennaioli, and Andrei Shleifer.** 2016. "Stereotypes." *Quarterly Journal of Economics*, 131(4): 1753–1794.
- Bordalo, Pedro, Katherine Coffman, Nicola Gennaioli, and Andrei Shleifer.** 2019. "Beliefs about gender." *American Economic Review*, 109(3): 739–73.
- Bottazzi, Laura, Marco Da Rin, and Thomas Hellmann.** 2016. "The importance of trust for investment: Evidence from venture capital." *Review of Financial Studies*, 29(9): 2283–2318.
- Brooks, Alison Wood, Laura Huang, Sarah Wood Kearney, and Fiona E Murray.** 2014. "Investors prefer entrepreneurial ventures pitched by attractive men." *Proceedings of the National Academy of Sciences*, 111(12): 4427–4431.
- Card, David, Stefano DellaVigna, Patricia Funk, Nagore Iriberry, et al.** 2019. "Are referees and editors in economics gender neutral?" *Quarterly Journal of Economics*.
- Chuprinin, Oleg, and Denis Sosyura.** 2018. "Family descent as a signal of managerial quality: Evidence from mutual funds." *Review of Financial Studies*, 31(10): 3756–3820.
- Coffman, Katherine.** 2014. "Evidence on self-stereotyping and the contribution of ideas." *Quarterly Journal of Economics*, 129(4): 1625–1660.
- Coffman, Katherine, Christine Exley, and Muriel Niederle.** 2020. "When gender discrimination is not about gender." *Management Science*.
- Cook, Cody, Rebecca Diamond, Jonathan Hall, John A List, Paul Oyer, et al.** 2018. "The gender earnings gap in the gig economy: Evidence from over a million rideshare drivers." *Working Paper*.
- Cornell, Bradford, and Ivo Welch.** 1996. "Culture, information, and screening discrimination." *Journal of Political Economy*, 104(3): 542–571.
- CSWEP.** 2018. "Report: Committee on the status of women in the economics profession." *American Economic Review*, 108: 704–721.
- Da Rin, Marco, Thomas Hellmann, and Manju Puri.** 2013. "A survey of venture capital research." *Handbook of the Economics of Finance*, 2: 573–648.
- Davies, Shaun, Edward Van Wesep, Van, and Brian Waters.** 2019. "On the magnification of small biases in decision-Making." *Working Paper*.
- Del Carpio, Lucia, and Maria Guadalupe.** 2018. "More women in tech? Evidence from a field experiment addressing social identity." *Working Paper*.
- Duchin, Ran, Mike Simutin, and Denis Sosyura.** 2019. "The Origins and Real Effects of the Gender Gap: Evidence from CEOsâ Formative Years." *Working Paper*.
- Egan, Mark L, Gregor Matvos, and Amit Seru.** 2019. "When Harry fired Sally: The double standard in punishing misconduct." *Working Paper*.

- Ewens, Michael, and Richard Townsend.** 2019. “Are early stage investors biased against women?” *Journal of Financial Economics*.
- Fang, Lily Hua, and Sterling Huang.** 2017. “Gender and connections among Wall Street analysts.” *The Review of Financial Studies*, 30(9): 3305–3335.
- Ferguson, Michael F, and Stephen R Peters.** 1995. “What constitutes evidence of discrimination in lending?” *Journal of Finance*, 50(2): 739–748.
- Fisman, Raymond, Daniel Paravisini, and Vikrant Vig.** 2017. “Cultural proximity and loan outcomes.” *American Economic Review*, 107(2): 457–92.
- Gennaioli, Nicola, and Andrei Shleifer.** 2010. “What comes to mind.” *Quarterly Journal of Economics*, 125(4): 1399–1433.
- Goldin, Claudia, and Cecilia Rouse.** 2000. “Orchestrating impartiality: The impact of “blind” auditions on female musicians.” *American Economic Review*, 90(4): 715–741.
- Gompers, Paul A, and Sophie Wang.** 2017a. “And the children shall lead: Gender diversity and performance in venture Capital.” *Working Paper*.
- Gompers, Paul A, and Sophie Wang.** 2017b. “Diversity in innovation.” *Working Paper*.
- Gompers, Paul, and Josh Lerner.** 1999. “An analysis of compensation in the US venture capital partnership.” *Journal of Financial Economics*, 51(1): 3–44.
- Gompers, Paul A, Vladimir Mukharlyamov, Emily Weisburst, and Yuhai Xuan.** 2014. “Gender effects in venture capital.” *Working Paper*.
- Gompers, Paul A, Will Gornall, Steven N Kaplan, and Ilya A Strebulaev.** 2020. “How do venture capitalists make decisions?” *Journal of Financial Economics*, 135(1): 169–190.
- Gornall, Will, and Ilya A Strebulaev.** 2019. “Gender, race, and entrepreneurship: A randomized field experiment on venture capitalists and angels.” *Working paper*.
- Haltiwanger, John, Ron S Jarmin, and Javier Miranda.** 2013. “Who creates jobs? Small versus large versus young.” *Review of Economics and Statistics*, 95(2): 347–361.
- Hombert, Johan, Antoinette Schoar, David Sraer, and David Thesmar.** 2019. “Can unemployment insurance spur entrepreneurial activity? Evidence from France.” *Journal of Finance*.
- Hombert, Johan, Antoinette Schoar, David Sraer, and David Thesmar.** 2020. “Can unemployment insurance spur entrepreneurial activity? Evidence from France.” *Journal of Finance*.
- Howell, Sabrina, and Ramana Nanda.** 2019. “Networking frictions in venture capital, and the gender gap in entrepreneurship.” *Working Paper*.
- Hsieh, Chang-Tai, Erik Hurst, Charles I Jones, and Peter J Klenow.** 2019. “The allocation of talent and US economic growth.” *Econometrica*, 87(5): 1439–1474.
- Huang, Jiekun, and Darren Kisgen.** 2013. “Gender and corporate finance: Are male executives overconfident relative to female executives?” *Journal of Financial Economics*, 108(3): 822–839.
- Huang, Laura, and Jone L Pearce.** 2015. “Managing the unknowable: The effectiveness of early-stage investor gut feel in entrepreneurial investment decisions.” *Administrative Science Quarterly*, 60(4): 634–670.
- Hvide, Hans K, and Georgios A Panos.** 2014. “Risk tolerance and entrepreneurship.” *Journal of Financial Economics*, 111(1): 200–223.
- Jannati, Sima, Alok Kumar, Alexandra Niessen-Ruenzi, and Justin Wolfers.** 2018. “In-group bias in financial markets.” *Working Paper*.

- Kaplan, Steven N, and Antoinette Schoar.** 2005. "Private equity performance: Returns, persistence, and capital flows." *Journal of Finance*, 60(4): 1791–1823.
- Kaplan, Steven N, and Josh Lerner.** 2010. "It ain't broke: The past, present, and future of venture capital." *Journal of Applied Corporate Finance*, 22(2): 36–47.
- Kaplan, Steven N, and Per Strömberg.** 2003. "Financial contracting theory meets the real world: An empirical analysis of venture capital contracts." *Review of Economic Studies*, 70(2): 281–315.
- Kaplan, Steven N, Mark M Klebanov, and Morten Sorensen.** 2012. "Which CEO characteristics and abilities matter?" *Journal of Finance*, 67(3): 973–1007.
- Keloharju, Matti, Samuli Knüpfer, and Joacim Tåg.** 2019. "What prevents women from reaching the top?" *Working Paper*.
- Kerr, Sari Pekkala, William R Kerr, and Tina Xu.** 2018. "Personality traits of entrepreneurs: A review of recent literature." *Foundations and Trends in Entrepreneurship*, 14(3): 279–356.
- Kumar, Alok.** 2010. "Self-selection and the forecasting abilities of female equity analysts." *Journal of Accounting Research*, 48(2): 393–435.
- Kumar, Alok, Alexandra Niessen-Ruenzi, and Oliver G Spalt.** 2015. "What's in a name? Mutual fund flows when managers have foreign-sounding names." *Review of Financial Studies*, 28(8): 2281–2321.
- Landier, Augustin, and David Thesmar.** 2008. "Financial contracting with optimistic entrepreneurs." *Review of Financial Studies*, 22(1): 117–150.
- Levine, Ross, and Yona Rubinstein.** 2017. "Smart and illicit: Who becomes an entrepreneur and do they earn more?" *Quarterly Journal of Economics*, 132(2): 963–1018.
- Ma, Song, and Allen Hu.** 2020. "Human interactions and financial investment: A video-based approach." *Working Paper*.
- Matsa, David A, and Amalia R Miller.** 2011. "Chipping away at the glass ceiling: Gender spillovers in corporate leadership." *American Economic Review*, 101(3): 635–39.
- Matsa, David A, and Amalia R Miller.** 2013. "A female style in corporate leadership? Evidence from quotas." *American Economic Journal: Applied Economics*, 5(3): 136–69.
- Meier, Kristina, Alexandra Niessen-Ruenzi, and Stefan Ruenzi.** 2017. "The impact of role models on women's self-selection in competitive environments." *Working Paper*.
- Moskowitz, Tobias J, and Annette Vissing-Jorgensen.** 2002. "The returns to entrepreneurial investment: A private equity premium puzzle?" *American Economic Review*, 92(4): 745–778.
- Niederle, Muriel, and Lise Vesterlund.** 2007. "Do women shy away from competition? Do men compete too much?" *Quarterly Journal of Economics*, 122(3): 1067–1101.
- Niessen-Ruenzi, Alexandra, and Stefan Ruenzi.** 2018. "Sex matters: Gender bias in the mutual fund industry." *Management Science*.
- Phelps, Edmund S, et al.** 1972. "The statistical theory of racism and sexism." *American Economic Review*, 62(4): 659–661.
- Puri, Manju, and David T Robinson.** 2013. "The economic psychology of entrepreneurship and family business." *Journal of Economics & Management Strategy*, 22(2): 423–444.
- Puri, Manju, and Rebecca Zarutskie.** 2012. "On the life cycle dynamics of venture-capital-and non-venture-capital-financed firms." *Journal of Finance*, 67(6): 2247–2293.
- Raina, Sahil.** 2019. "VCs, Founders, and the Performance Gender Gap." *Working Paper*.

- Reuben, Ernesto, Paola Sapienza, and Luigi Zingales.** 2014. "How stereotypes impair women's careers in science." *Proceedings of the National Academy of Sciences*, 111(12): 4403–4408.
- Robb, Alicia M, and David T Robinson.** 2014. "The capital structure decisions of new firms." *Review of Financial Studies*, 27(1): 153–179.
- Sapienza, Paola, Luigi Zingales, and Dario Maestripieri.** 2009. "Gender differences in financial risk aversion and career choices are affected by testosterone." *Proceedings of the National Academy of Sciences*, 106(36): 15268–15273.
- Sarsons, Heather.** 2019. "Interpreting signals in the labor market: evidence from medical referrals." *Working Paper*.
- Shaffer, Sherrill.** 1996. "Evidence of discrimination in lending: An extension." *Journal of Finance*, 51(4): 1551–1554.
- Shurchkov, Olga.** 2012. "Under pressure: Gender differences in output quality and quantity under competition and time constraints." *Journal of the European Economic Association*, 10(5): 1189–1213.
- Tate, Geoffrey, and Liu Yang.** 2015. "Female leadership and gender equity: Evidence from plant closure." *Journal of Financial Economics*, 117(1): 77–97.
- Winton, Andrew, and Vijay Yerramilli.** 2008. "Entrepreneurial finance: Banks versus venture capital." *Journal of Financial Economics*, 88(1): 51–79.

Figures

Figure 1. Gender Funding Gap

Source: SINE survey. This figure plots the unconditional means by gender group of start-ups that receive external equity financing or bank debt.

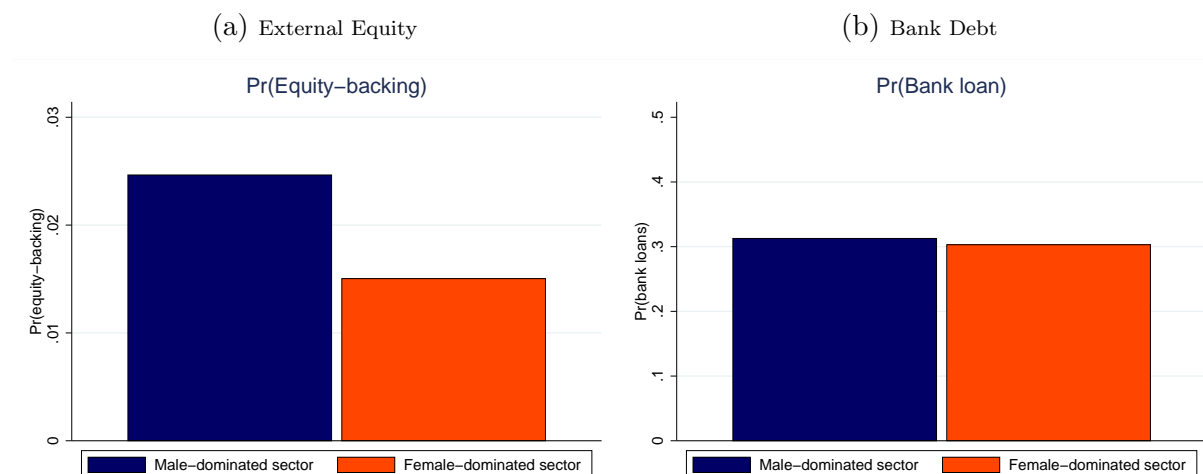
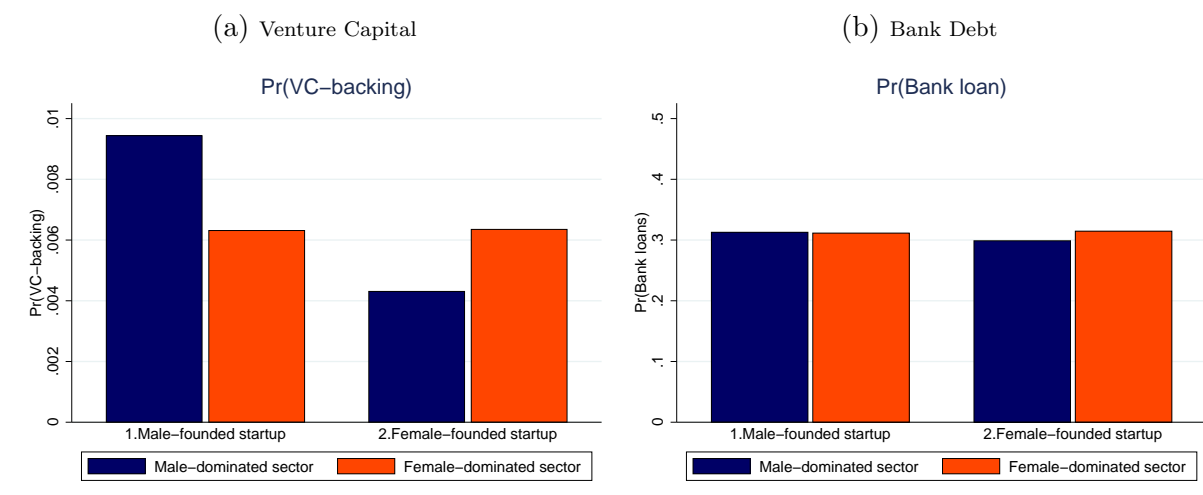


Figure 2. Gender Funding Gap and Context-dependent Stereotypes

Source: SINE survey. The figure plots the unconditional means by founder gender group and gender-dominated sectors of start-ups that receive VC or bank debt. A female-dominated sector includes at least 50% of new female-led start-ups within a 4-digit French SIC sector.



Tables

Table 1. Male and Female Start-ups Founders and Male and Female-dominated Sectors

Source: SINE survey. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. Panel A reports number and percentage of male and female-founded start-ups. Panel B reports the distributions of male and female-founded start-ups incorporated in male- and female-dominated sectors. A female-dominated sectors is a 4-digit French SIC that includes at least 50% of start-ups founded by female entrepreneurs.

Panel A. Male and female start-ups founders					
	Cohorts				
	2002	2006	2010	2014	Total
Male	9,718	11,809	24,613	21,899	68,039
	0.77	0.75	0.73	0.72	0.74
Female	2,896	3,911	9,067	8,533	24,407
	0.23	0.25	0.27	0.28	0.26
Total	12,614	15,720	33,680	30,432	92,446

Panel B. Start-ups founders by male and female-dominated sectors					
	Cohorts				
	2002	2006	2010	2014	Total
<u>M and F in Male-dominated sectors</u>	11,264	13,757	30,762	26,379	82,162
	0.89	0.88	0.91	0.87	0.89
M in M-dominated sectors	9,243	11,131	23,501	20,445	64,320
	0.82	0.81	0.76	0.78	0.78
F in M-dominated sectors	2,021	2,626	7,261	5,934	17,842
	0.18	0.19	0.24	0.22	0.22
<u>M and F in Female-dominated sectors</u>	1,350	1,963	2,918	4,053	10,284
	0.11	0.12	0.09	0.13	0.11
M in F-dominated sectors	475	678	1,112	1,454	3,719
	0.35	0.35	0.38	0.36	0.36
F in F-dominated sectors	875	1,285	1,806	2,599	6,565
	0.65	0.65	0.62	0.64	0.64
Total	12,614	15,720	33,680	30,432	92,446

Table 2. Entrepreneurs' and Start-ups' Characteristics

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. The table presents entrepreneurs' biographical characteristics (panel A), motivation and optimism items (panel B), family structure and composition of the founding team (panel C), start-up's financing sources at creation (panel D), employment size at creation (panel E), balance sheet information from the creation year to five years onward (panel F), and sectoral characteristics (panel G). The mean and number of observations by gender group are reported as are t-statistics and p-values of the mean differences between male and female entrepreneurs. Variable definitions and data sources are provided in Appendix C.

	All	Male		Female			
Variables	Mean	N	Mean	N	Mean	difference	t-stat
Panel A. Biographical characteristics							
Age ≥ 40	0.48	68,039	0.49	24,407	0.45	0.04***	(11.28)
French	0.91	68,039	0.90	24,407	0.93	-0.03***	(-13.55)
No degree	0.20	68,039	0.21	24,407	0.16	0.05***	(18.45)
High school	0.44	68,039	0.45	24,407	0.42	0.04***	(9.62)
Bachelor's	0.14	68,039	0.13	24,407	0.17	-0.04***	(-15.79)
Master's/PhD	0.22	68,039	0.21	24,407	0.26	-0.04***	(-13.76)
Elite engineering school	0.05	68,039	0.06	24,407	0.03	0.03***	(19.48)
Expert	0.62	68,039	0.66	24,407	0.53	0.13***	(35.16)
Serial	0.30	68,039	0.32	24,407	0.22	0.10***	(31.80)
Panel B. Initial motivations and optimism							
High-growth oriented	0.29	58,768	0.31	21,694	0.25	0.06***	(16.40)
<u>Motivation for entry:</u>							
Independence	0.61	68,037	0.62	24,407	0.60	0.02***	(6.18)
Taste	0.45	68,035	0.46	24,406	0.42	0.04***	(10.08)
Add earnings	0.24	58,318	0.25	21,511	0.22	0.03***	(10.13)
Opportunity	0.20	68,033	0.20	24,406	0.22	-0.02***	(-6.63)
New idea	0.16	68,033	0.16	24,406	0.17	-0.01***	(-4.09)
<u>Optimistic entrepreneurs:</u>							
Optimism at start	0.30	40,140	0.33	15,264	0.22	0.11***	(26.67)
Optimism at t+3	0.16	34,025	0.17	11,904	0.13	0.04***	(11.41)
Optimism at t+5	0.13	19,076	0.14	6,617	0.11	0.03***	(7.27)
Panel C. Family structure and team composition							
<u>Family structure:</u>							
Married	0.71	58,321	0.73	21,511	0.68	0.05***	(13.49)
Children	0.56	33,708	0.56	12,444	0.58	-0.02***	(-4.52)
<u>Team composition:</u>							
Alone	0.73	66,515	0.73	23,551	0.73	-0.00	(-0.90)
Spouse	0.11	66,513	0.10	23,550	0.13	-0.03***	(-10.65)
Relatives	0.05	66,512	0.05	23,550	0.05	-0.00	(-0.96)
Associates	0.13	66,514	0.13	23,550	0.11	0.03***	(11.41)

Entrepreneurs' and Start-ups' Characteristics (*Continued*)

	All	Male		Female		difference	t-stat
Variables	Mean	N	Mean	N	Mean		
Panel D. Financing sources							
External financing	0.51	68,039	0.51	24,407	0.52	-0.01**	(-2.07)
Bank loans	0.31	68,039	0.31	24,407	0.30	0.01***	(2.81)
Household debt	0.13	68,039	0.12	24,407	0.14	-0.02***	(-6.73)
Non-bank loans	0.10	68,039	0.09	24,407	0.11	-0.02***	(-9.47)
Subsidies	0.17	68,039	0.17	24,407	0.18	-0.01*	(-1.83)
External equity:	0.03	68,039	0.03	24,407	0.02	0.01***	(10.10)
Venture capital	0.01	56,230	0.01	20,496	0.007	0.003***	(7.45)
Other external equity	0.03	68,039	0.03	24,407	0.02	0.01***	(7.98)
Panel E. Employment size							
Employment size at start:	0.69	67,039	0.73	23,907	0.59	0.15***	(5.96)
Zero	0.77	67,039	0.76	23,907	0.79	-0.03***	(-9.10)
1	0.11	67,039	0.11	23,907	0.10	0.01***	(2.63)
2	0.05	67,039	0.05	23,907	0.05	0.01***	(3.17)
3	0.02	67,039	0.03	23,907	0.02	0.00***	(3.78)
3	0.02	67,039	0.03	23,907	0.02	0.00***	(3.78)
4-5	0.02	67,039	0.03	23,907	0.02	0.01***	(6.14)
6-10	0.02	67,039	0.02	23,907	0.01	0.00***	(5.24)
11+	0.01	67,039	0.01	23,907	0.01	0.00**	(2.55)
Employment size at t+3	1.14	37,627	1.20	12,344	0.96	0.24***	(5.00)
Employment size at t+5	1.18	34,309	1.24	11,458	1.00	0.24***	(4.25)
Panel F. Balance sheet information and income statement (Panel 5 years)							
N. employees	1.61	257243	1.672	82508	1.406	0.27***	(9.31)
Sales over assets (%)	0.17	298776	0.17	102428	0.17	0.26	(0.08)
Foreign sales (%)	0.03	288714	0.031	99466	0.033	-0.00***	(-3.37)
ROA (%)	0.26	298776	0.251	102428	0.301	-0.05***	(-7.10)
Survival 3 years (%)	0.86	298776	0.867	102428	0.841	0.03***	(19.75)
Survival 5 years (%)	0.75	298776	0.761	102428	0.732	0.03***	(18.31)
Tangible/total assets (%)	0.23	298776	0.224	102428	0.246	-0.02***	(-2.73)
Ln(total assets)	3.83	298776	3.884	102428	3.657	0.23***	(41.53)
Panel G. Sectoral characteristics							
Sector size (total sales Me)	18.56	1402	19.235	239	14.583	4.652**	(2.45)
N. start-ups within sector	140	1414	148	242	96	52.59***	(2.64)
N. backed firms within sector	3.81	1414	4.20	242	1.54	2.67***	(6.34)
N. VC-backed firms within sector	0.70	1414	0.77	242	0.29	0.48***	(4.10)
Characteristics of start-ups within sector:							
Mean Sales (k€)	8.99	1402	9.52	239	5.90	3.62**	(2.52)
Vol Sales (k€)	61.83	1400	66.11	239	36.74	2.98***	(3.27)
Mean N. employees	28.48	1402	29.64	239	21.70	7.94***	(2.63)

Table 3. Gender, External Equity and Other Financing Sources

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This table uses OLS to analyze the effect of gender on the use of different financing sources. The dependent variables are as follows: *External equity* financing including VC (panel A, columns 1 and 2), *VC* financing only (panel A, columns 3 and 4), *External financing* any kind (Panel B, column 1), *Bank debt* financing (Panel B, column 2), use of *Household debt* (Panel B, column 3), and use of *Subsidies* (Panel B, column 4). *Female* is a dummy variable that is equal to 1 if the start-up is run by a woman. The human capital controls include the dummy variables *Bachelor's*, *Master's/PhD*, which respectively equal one if the entrepreneur has at least a three-year or at least a five-year university degree, *Expert*, which equals one if the entrepreneur has at least three years of work experience in the sector, and *Serial*, which equals one if the entrepreneur has previously founded another start-up. Start-up controls include the incorporation status, the ratio of tangible assets and the logarithm of firm's total assets. All models include county and 4-digit SIC sector \times cohort-year fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Panel A. External Equity and Venture Capital

Dependent variables	1(External equity)		1(Venture capital)	
	(1)	(2)	(3)	(4)
Female	-0.0081*** (-6.76)	-0.0055*** (-4.66)	-0.0029*** (-5.13)	-0.0023*** (-3.89)
Age \geq 40		0.0026** (2.58)		0.0010* (1.79)
French		-0.0018 (-0.94)		0.0008 (0.80)
Bachelor's		-0.0009 (-0.60)		-0.0020*** (-2.99)
Master's/PhD		0.0085*** (5.73)		0.0029*** (3.44)
Expert		0.0002 (0.20)		0.0002 (0.22)
Serial		0.0130*** (10.46)		0.0019** (2.42)
Incorporated		0.0156*** (11.68)		0.0045*** (5.82)
Tangible/total assets		-0.0018 (-0.70)		-0.0005 (-0.29)
Ln(total assets)		0.0038*** (8.21)		0.0010*** (3.59)
Sector \times year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R^2	0.038	0.044	0.039	0.040
N	92338	92338	76725	76725

Gender, External Equity and Other Financing Sources
(*Continued*)

Panel B. Other Financing Sources

Dependent variables	1(External financing) (1)	1(Bank debt) (2)	1(Household debt) (3)	1(Subsidies) (4)
Female	0.0063 (1.01)	-0.0029 (-0.63)	0.0069** (2.41)	0.0029 (0.71)
Age \geq 40	-0.0364*** (-8.99)	-0.0406*** (-11.16)	-0.0003 (-0.12)	-0.0091*** (-3.28)
French	0.1186*** (13.96)	0.1087*** (20.08)	0.0294*** (6.33)	0.0493*** (11.82)
Bachelor's	0.0224*** (3.94)	0.0299*** (4.29)	0.0036 (1.15)	0.0173*** (3.87)
Master's/PhD	-0.0102* (-1.72)	-0.0093 (-1.50)	-0.0082*** (-2.78)	0.0128*** (3.74)
Expert	0.0181*** (3.81)	0.0255*** (5.34)	0.0000 (0.02)	-0.0119*** (-3.64)
Serial	-0.0495*** (-7.88)	-0.0319*** (-5.80)	-0.0054* (-1.80)	-0.0715*** (-21.57)
Incorporated	0.0509*** (5.12)	0.1366*** (14.11)	-0.0414*** (-7.94)	-0.0475*** (-12.76)
Tangible/total assets	0.1811*** (15.03)	0.1784*** (16.05)	0.0518*** (7.29)	0.0732*** (9.43)
Ln(total assets)	0.0203*** (8.54)	0.0266*** (9.27)	0.0047*** (4.46)	-0.0051*** (-5.10)
Sector \times year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R^2	0.162	0.134	0.055	0.241
N	92338	92338	92338	92338

Table 4. Gender Stereotypes, External Equity and Other Financing Sources

Source: SINE survey, firm registry, employer payrolls and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This uses OLS to analyze the effect of gender stereotypes on the use of different financing sources. The dependent variables are as follows: *External equity* which equals to one if the start-up uses VC or other external equity financing (Panel A), *External financing* any kind (Panel B, column 1), *Bank debt* financing (Panel B, column 2), use of *Household debt* (Panel B, column 3), and use of *Subsidies* (Panel B, column 4). The independent variable *Female-dominated sector* equals one if more than 50% of firms in the 4-digit French SIC sector are female-led: Panel A, column 1 and panel B are based on the % of female entrepreneurs (SINE); panel A column 2 is based on the % of new female business owners (firm registry); column 3 is based on the % of all female business owners (firm registry); column 4 is based on the % of female CEOs (employer payroll). Human capital controls include entrepreneur's age, citizenship, education and experience dummy variables. Start-up controls include an incorporation status dummy variable, the ratio of tangible assets and the logarithm of firm's total assets. Sector controls are the within-sector percentage of female-led firms, the Herfindahl index and the logarithm of total sector sales. All models include 4-digit SIC sector, cohort-year and county fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** mean significantly different from zero at the 10, 5, and 1% levels, respectively.

Panel A. External Equity

Dependent variable	1(External Equity)			
	Entrepreneurs	New business owners	All business owners	CEOs
Measures of female-dominated sector	(1)	(2)	(3)	(4)
Female	-0.0069*** (-5.45)	-0.0081*** (-6.33)	-0.0073*** (-5.72)	-0.0077*** (-5.28)
Female-dominated sector	-0.0000 (-0.00)	-0.0005 (-0.14)	-0.0003 (-0.08)	-0.0015 (-0.38)
F × F-dominated sector	0.0080*** (3.23)	0.0105*** (3.93)	0.0078*** (2.71)	0.0052** (2.04)
Human capital controls	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes
Sector controls	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R^2	0.026	0.026	0.026	0.026
N	92529	92356	92439	92529

Gender Stereotypes, External Equity and Other Financing Sources
(*Continued*)

Panel B. Alternative Financing Sources

Dependent variables	1(External financing) (1)	1(Bank debt) (2)	1(Household debt) (3)	1(Subsidies) (4)
Female	0.0023 (0.37)	-0.0039 (-0.83)	0.0066** (2.23)	-0.0029 (-0.73)
Female-dominated sector	0.0424 (1.44)	0.0451* (1.87)	0.0120 (0.98)	0.0203 (0.89)
F × F-dominated sector	0.0261 (1.51)	0.0069 (0.44)	0.0018 (0.21)	0.0350*** (2.73)
Human capital controls	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes
Sector controls	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R^2	0.147	0.121	0.041	0.221
N	92529	92529	92529	92529

Table 5. Corporate Performance of Selected Entrepreneurs

Source: SINE survey, tax files, employer payrolls and VentureXpert. *Sample:* New firms founded in 2002, 2006, 2010 and 2014 that are backed by external equity investors. This uses OLS to analyze the performance of minority-led start-ups relative to start-ups led by entrepreneurs who belong to the majority gender group. Panel A examines the performance of female-founded start-ups in male-dominated sectors. Panel B examines the performance of male-founded start-ups in female-dominated sectors. The dependent variables are as follows: the number of employees from t+1 to t+5 (column 1), the ratio of sales over assets from t+1 to t+5 (column 2), % foreign sales (column 3), the *ROA* (column 4), survival after 3 and 5 years respectively (columns 5 and 6), exits by IPO or M&A respectively (columns 7 and 8). In panel A, *Female* is interacted with *Male-dominated sector* which equals one if more than 50% of firms in the 4-digit French SIC are male-led. In panel B, *Male* is interacted with *Female-dominated sector* which equals one if more than 50% of firms in the 4-digit French SIC are female-led. Models in columns 1 to 6 include human capital and start-up controls, as well as 4-digit SIC sector, cohort-year and county fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Panel A. Female entrepreneurs in male-dominated sectors

Dependent variables	N. Employees (1)	Sales over assets (2)	Foreign sales (3)	ROA (4)	Survival 3 years (5)	Survival 5 years (6)	IPO (7)	M&A (8)
Female	-3.1679** (-2.05)	-0.5700*** (-2.70)	-0.0207** (-2.42)	0.0505*** (2.63)	0.0555 (0.94)	0.0032 (0.05)	-0.066** (-2.40)	-0.017 (-0.30)
Male-dominated sector	-1.7976 (-1.40)	-0.5967 (-1.57)	-0.0157 (-1.35)	0.0300 (1.26)	-0.0607 (-0.81)	-0.0658 (-0.80)	-0.019 (-0.82)	-0.040 (-1.26)
Female × M-dominated sector	3.6962** (2.26)	0.7132*** (2.77)	0.0271*** (2.85)	-0.0644*** (-3.00)	-0.0882 (-1.38)	-0.0539 (-0.73)	0.079** (2.19)	-0.053 (-0.81)
Human capital controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
R^2	0.257	0.114	0.242	0.120	0.158	0.160	0.003	0.004
N	8708	8885	8893	8752	2705	2705	1256	1643

Panel B. Male entrepreneurs in female-dominated sectors

Dependent variables	N. Employees (1)	Sales over assets (2)	Foreign sales (3)	ROA (4)	Survival 3 years (5)	Survival 5 years (6)	IPO (7)	M&A (8)
Male	-0.5284 (-1.07)	-0.1433 (-0.85)	-0.0064 (-1.33)	0.0138 (1.39)	0.0327 (1.29)	0.0508* (1.82)	-0.012 (-0.54)	0.070** (2.33)
Female-dominated sector	-1.8987 (-1.54)	-0.1166 (-0.36)	-0.0115 (-0.81)	0.0344 (1.44)	0.1489* (1.31)	0.1198 (1.83)	-0.060** (-2.16)	0.093 (1.63)
Male × F-dominated sector	3.6962** (2.26)	0.7132*** (2.77)	0.0271*** (2.85)	-0.0644*** (-3.00)	-0.0882 (-1.38)	-0.0539 (-0.73)	0.079** (2.19)	-0.053 (-0.81)
Human capital controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
R^2	0.257	0.114	0.242	0.120	0.158	0.160	0.003	0.004
N	8708	8885	8893	8752	2705	2705	1256	1643

Table 6. Do Entrepreneurs Self-Select into Sectors?

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010 and 2014. This table uses OLS to test whether entrepreneurs enter female-dominated sectors or male-dominated sectors. Panel A includes all start-ups. Panel B includes only start-ups that are backed by external equity investors. The dependent variable is *Female-dominated sector* which equals one if at least 50% of new start-ups within the 4-digit French SIC sector are female-led. The independent variables are entrepreneurs' human capital and motivation items interacted with the entrepreneur's gender. All models include human capital controls and cohort-year fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Panel A. All start-ups								
Dependent variable	1(Female-dominated sector)							
Items	Elite engineer school (1)	Serial (2)	Optimistic (3)	High- growth oriented (4)	New idea (5)	Opportunity (6)	Taste (7)	Independence (8)
Item	0.0017 (0.18)	0.0074 (1.01)	-0.0015 (-0.13)	0.0011 (0.18)	0.0112 (1.18)	0.0060 (1.19)	-0.0006 (-0.11)	-0.0021 (-0.44)
Female × Item	-0.1164* (-1.74)	-0.0361** (-2.07)	-0.1202*** (-3.65)	-0.0759*** (-3.40)	-0.0432 (-1.32)	-0.0258** (-2.23)	0.0054 (0.35)	0.0653* (1.88)
Gender	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Human capital controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.197	0.197	0.224	0.208	0.197	0.196	0.196	0.199
N	92446	92446	55404	80462	92439	92439	92441	92444
Panel B. Equity-backed start-ups								
Dependent variable	1(Female-dominated sector)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Item	0.0509** (2.09)	0.0071 (0.50)	0.0044 (0.29)	-0.0013 (-0.11)	0.0167 (0.87)	0.0134 (1.13)	-0.0111 (-1.12)	-0.0123 (-1.03)
Female × Item	-0.0403 (-0.60)	0.0140 (0.24)	-0.1131 (-1.39)	-0.0813 (-1.59)	-0.0172 (-0.30)	-0.0326 (-0.83)	-0.0308 (-0.63)	0.0438 (1.02)
Gender	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Human capital controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.143	0.144	0.156	0.163	0.144	0.144	0.145	0.145
N	2044	2044	1337	1550	2043	2043	2043	2044

Table 7. Gender Stereotypes and Human Capital

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This uses OLS to test whether human capital mitigates gender stereotypes on the use of external equity financing. The dependent variable is *External equity* which equals to one if the start-up uses VC or other external equity financing. The independent variable *Female-dominated sector* equals one if more than 50% of start-ups in the 4-digit French SIC sector are female-led (SINE). This variable is interacted with various human capital items: *Master's/PhD* (column 1), *Elite engineering school* which equals to one if the entrepreneur graduated from a top engineering school (column 2); industry *Expert* (column 3), *Serial* entrepreneur (column 4). All models include other human capital variables that are not interacted, start-up controls and sector controls. Start-up controls include an incorporation status dummy variable, the ratio of tangible assets and the logarithm of firm's total assets. Sector controls are the within-sector percentage of female-led firms, the Herfindahl index and the logarithm of total sector sales. All models include 4-digit SIC sector, cohort-year and county fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** mean significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable	1(External equity)			
Item	Master's/ PhD	Elite engineering school	Expert	Serial
	(1)	(2)	(3)	(4)
Female	-0.0053*** (-3.83)	-0.0080*** (-6.32)	-0.0073*** (-4.18)	-0.0036** (-2.45)
Female-dominated sector	-0.0003 (-0.07)	-0.0027 (-0.67)	-0.0024 (-0.45)	0.0004 (0.12)
F × Female-dominated sector	0.0088*** (2.80)	0.0103*** (4.08)	0.0116** (2.38)	0.0074*** (2.59)
Item	0.0106*** (5.72)	0.0098** (2.50)	-0.0003 (-0.20)	0.0161*** (9.89)
F × Item	-0.0063** (-2.56)	0.0037 (0.40)	0.0007 (0.30)	-0.0132*** (-4.36)
F-dominated sector × Item	0.0003 (0.04)	0.0338** (2.17)	0.0035 (0.62)	-0.0018 (-0.30)
F × F-dominated sector × Item	-0.0009 (-0.14)	-0.0216 (-0.80)	-0.0051 (-0.81)	0.0035 (0.41)
Human capital controls	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes
Sector controls	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R ²	0.026	0.025	0.026	0.026
N	92529	92529	92529	92529

Table 8. Gender Stereotypes, Team and Family Structure

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This table uses OLS to test whether starting as a team or the entrepreneur's family structure mitigates gender stereotypes. The dependent variable is *External equity* which equals to one if the start-up uses VC or other external equity financing. The independent variable *Female-dominated sector* equals one if more than 50% of start-ups in the 4-digit French SIC sector are female-led (SINE). The effect of gender stereotypes is tested on different sub-samples: start-ups started by a stand-alone entrepreneur (column 1), start-ups founded by a team (column 2), teams formed by spouses (column 3), teams formed by siblings (column 4), teams formed by associates (column 5), start-ups founded by a married entrepreneur (column 6), start-ups founded by a single entrepreneur (column 7). All models include human capital controls, start-ups controls and sector controls. They also include county, 4-digit SIC sector and cohort-year fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable Sub-samples	1(External equity)						
	Alone	Team	Type of teams			Married	Single
			Spouses	Siblings	Associates		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-0.0048*** (-3.74)	-0.0145*** (-5.36)	-0.0056 (-1.58)	-0.0120** (-2.43)	-0.0167*** (-4.01)	-0.0046*** (-2.90)	-0.0132*** (-6.68)
Female-dominated sector	-0.0002 (-0.04)	-0.0116 (-1.37)	-0.0072 (-0.73)	-0.0242* (-1.86)	-0.0066 (-0.54)	-0.0030 (-0.49)	-0.0041 (-0.60)
F × Female-dominated sector	0.0078*** (3.02)	0.0113* (1.82)	0.0068 (0.88)	0.0115 (1.26)	0.0025 (0.32)	0.0032 (0.97)	0.0201*** (4.07)
Human capital controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.025	0.049	0.051	0.095	0.070	0.029	0.043
N	65878	24206	11940	6422	13684	69626	22838

Table 9. Gender Stereotypes, Initial Motivations and Optimism

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This uses OLS to test whether motivation mitigates gender stereotypes on the use of external equity financing. The dependent variable is *External equity* which equals to one if the start-up uses VC or other external equity financing. The independent variable *Female-dominated sector* equals one if more than 50% of start-ups in the 4-digit French SIC sector are female-led (SINE). This variable is interacted with various motivation items: *High-growth oriented* which equals one if the entrepreneur intends to develop the company and 0 if he intends to become self-employed (column 1), *New idea* (column 2), *Taste* (column 3), *Opportunity* (column 4), and *Independence* (column 5) stem from the question “What are your three main motivations?”, and correspond to the respective following answers “a new idea of product, service, or market”, “the taste for entrepreneurship or new challenges”, “an opportunity to create a start-up”, and “the desire to be independent”, and *Optimism at start* (column 6) equals one if the entrepreneurs makes expectations errors. All models include human capital controls, start-ups controls and sector controls. They also include county, 4-digit SIC sector and cohort-year fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable	1(External equity)					
	High-growth	Ex ante Motivations				Optimism
	oriented	New idea	Taste	Opportunity	Independence	at start
Items	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.0036*** (-2.86)	-0.0060*** (-4.37)	-0.0044*** (-2.96)	-0.0071*** (-5.45)	-0.0108*** (-5.17)	-0.0056*** (-3.42)
Female-dominated sector	-0.0029 (-0.68)	-0.0011 (-0.21)	0.0036 (0.73)	-0.0004 (-0.08)	0.0027 (0.43)	0.0011 (0.17)
F × Female-dominated sector	0.0079*** (2.72)	0.0086*** (2.78)	0.0059 (1.64)	0.0090*** (3.90)	0.0060 (1.07)	0.0101** (2.57)
Item	0.0120*** (7.40)	0.0087*** (4.28)	0.0056*** (4.24)	0.0051*** (3.37)	-0.0101*** (-8.43)	0.0121*** (4.40)
F × Item	-0.0094*** (-3.75)	-0.0051 (-1.35)	-0.0053** (-2.38)	0.0005 (0.16)	0.0062** (2.36)	-0.0124** (-2.57)
F-dominated sector × Item	-0.0048 (-0.95)	0.0050 (0.46)	-0.0087** (-2.41)	0.0010 (0.17)	-0.0053 (-0.96)	0.0003 (0.03)
F × F-dominated sector × Item	0.0014 (0.18)	-0.0036 (-0.36)	0.0041 (0.83)	-0.0042 (-0.58)	0.0037 (0.56)	-0.0047 (-0.31)
Human capital controls	Yes	Yes	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.025	0.026	0.026	0.026	0.027	0.032
N	80505	92520	92524	92522	92527	61768

Table 10. Age Stereotypes, External Equity and Other Financing Source

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This table uses OLS to analyze the effect of age stereotypes on the use of different financing sources. *External equity* which equals to one if the start-up uses VC or other external equity financing (column 1), *Bank debt* financing (column 2), use of *Household debt* (column 3), and use of *Subsidies* (column 4). The independent variable *Age* \geq 50 equals one if the entrepreneur is 50 years old or older. *Young entrepreneur sector* equals one if the median CEO's age within the 4-digit French SIC sector is younger than 40 years old. Human capital controls include entrepreneur's gender, citizenship, education and experience dummy variables. Start-up controls include the incorporation status, the ratio of tangible assets and the logarithm of firm's total assets. Sector controls include the Herfindahl index, the logarithm of total sector sales and the within sector percentage of female-founded stat-ups. All models 4-digit SIC sector, cohort-year and county fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variables	1(External equity) (1)	1(Bank debt) (2)	1(Household debt) (3)	1(Subsidies) (4)
Age \geq 50 years old	0.0015 (0.95)	-0.0694*** (-15.96)	-0.0061** (-2.24)	-0.0228*** (-6.41)
Young entrepreneur sector	0.0182** (2.48)	-0.0445 (-0.62)	0.0010 (0.05)	0.0619 (1.22)
Age \geq 50 x Young entrepreneur sector	-0.0358*** (-3.11)	0.0295 (0.36)	0.0578 (1.33)	0.0098 (0.44)
Human capital controls	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes
Sector controls	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R^2	0.026	0.122	0.041	0.221
N	92524	92524	92524	92524

Table 11. Do Investors Invest in Entrepreneurs of the Same Gender?

Source: VentureXpert, tax files and employer payrolls. *Sample:* Start-ups that received external equity financing from 2002 to 2016, that could be linked to the tax files and employer payrolls database. This table uses OLS to examine the homophily hypothesis. It tests whether female (male) investors are more likely to invest in female (male)-led firms. The dependent variable *Female* is the entrepreneur's gender. The independent variable *Female investor* is the investor's gender. Both the entrepreneur's and investor's gender are identified using the CEO occupation code, or if not available, using the highest paid employee in employer payrolls database. *Female-dominated sector* equals one if more than 50% of firms in the 4-digit SIC sector are female-led. The regressions are run by type of external equity. Robust standard errors are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable	1(Female entrepreneur)				
	External equity	Venture capital	Private equity	Angel	CVC
Types of equity	(1)	(2)	(3)	(4)	(5)
Female investor	0.029 (0.81)	0.007 (0.15)	0.021 (0.44)	0.135 (1.42)	-0.167** (-2.56)
Female-dominated sector	0.176*** (4.68)	0.202*** (3.11)	0.156*** (3.44)	0.127 (0.92)	-0.167** (-2.56)
Female investor × F-dominated sector	-0.103 (-0.81)	-0.322*** (-4.04)	-0.083 (-0.54)	0.593*** (3.58)	0.167** (2.56)
Constant	0.128*** (12.97)	0.113*** (8.20)	0.129*** (10.03)	0.145*** (5.36)	0.167** (2.56)
R^2	0.024	0.029	0.021	0.062	0.032
N	1430	641	861	210	43

Table 12. Do Experienced Investors Invest in Female-led Start-ups?

Source: VentureXpert, tax files and employer payrolls. *Sample:* Start-ups that received external equity financing from 2002 to 2016, that could be linked to the tax files and employer payrolls databases. This table uses OLS to test whether investors who invested in female-led start-ups in the past are more likely to invest female-led firms. The dependent variable is the entrepreneur's gender. The independent variable *Investor experience* equals one if the investor has at least one female-led start-up in her portfolio the year before investing in the start-up. *Female-dominated sector* equals one if more than 50% of firms the 4-digit SIC sector are female-led. The regressions are run by type of external equity. Robust standard errors are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable	1(Female entrepreneur)				
	External equity	Venture capital	Private equity	Angel	CVC
Types of equity	(1)	(2)	(3)	(4)	(5)
Investor experience	0.035** (2.01)	0.021 (0.89)	0.040* (1.70)	-0.060 (-1.02)	0.062 (0.94)
Female-dominated sector	0.064 (1.50)	0.097 (1.30)	0.020 (0.42)	-0.064 (-0.45)	-0.071* (-1.76)
Experience × F-dominated sector	0.108* (1.79)	0.029 (0.28)	0.155** (2.23)	0.251 (1.17)	-0.062 (-0.94)
Constant	0.108*** (8.06)	0.103*** (5.96)	0.107*** (5.69)	0.207*** (3.86)	0.071* (1.76)
R^2	0.020	0.012	0.022	0.011	0.021
N	1790	773	1079	272	96

Variable Descriptions

Variable	Description
Dependent variables (Source: SINE)	
External equity	Dummy variable that equals one if the start-up uses venture capital or other equity financing and zero otherwise.
Venture capital	Dummy variable that equals one if the start-up uses VC financing and zero otherwise. It is available only for 2002, 2010, and 2014.
External financing	Dummy variable that equals one if the start-up uses any source of external financing and zero otherwise.
Bank debt	Dummy variable that equals one if the start-up uses bank debt granted to the start-up and zero otherwise.
Household debt	Dummy variable that equals one if the start-up uses household debt granted to the founder's household and zero otherwise.
Subsidies	Dummy variable that equals one if the start-up uses an equity stipend coming from various public programs and zero otherwise. Examples of public programs are ACCRE, NACRE, PCE, CIR programs, OSEO innovation grants, and AGEFIPH aid.
Dependent variables (Source: VentureXpert)	
External equity	Dummy variable that equals one if the company receives VC, other private equity, corporate venture capital, or angel investment financing and zero otherwise.
Venture capital	Dummy variable that equals one if the company receives VC financing and zero otherwise.
Private equity	Dummy variable that equals one if the company receives PE financing and zero otherwise.
CVC	Dummy variable that equals one if the company receives corporate venture capital financing and zero otherwise.
Angel	Dummy variable that equals one if the company receives angel investment financing and zero otherwise.
Key independent variables (Source: SINE)	
Female	Dummy variable that equals one if the start-up is led by a female entrepreneur and zero if it is led by a male entrepreneur.
Age ≥ 40	Dummy variable that equals one if the entrepreneur is 40 years old or older at creation.
Age ≥ 50	Dummy variable that equals one if the entrepreneur is 50 years old or older at creation.
French	Dummy variable that equals one if the entrepreneur is a French citizen and zero otherwise.
Bachelor's	Dummy variable that equals one if the entrepreneur's highest diploma is a three-year bachelor's degree (License) and zero otherwise.
Master's/PhD	Dummy variable that equals one if the entrepreneur has at least a five-year master's degree, including engineering, JD, MD, and PhD degrees (Master, Grande école, Doctorat), and zero otherwise.
Elite engineering school	Dummy variable that equals one if the entrepreneur has graduated from a top engineering school (Grande école d'ingénieur, e.g., Ecole Polytechnique, Centrale, Mines among others), and zero otherwise.
Expert	Dummy variable that equals one if the entrepreneur has at least three years of prior work experience in the sector in which the start-up is incorporated and zero otherwise.
Serial	Dummy variable that equals one if the entrepreneur has already founded a start-up and zero otherwise.
Optimism at start	Dummy variable that corresponds to the difference between initial hiring expectations and subsequent realizations (Thesmar and Landier, 2009). Expectation equals one when the entrepreneur answers "Yes" to the question "Do you plan to hire over the next 12 months?" and zero otherwise. Realization equals one if the firm labor force increases by at least two employees in the year after creation and zero otherwise. Note that Optimism at start takes a value of zero if Realization > Expectation. Optimism is also computed at periods t+3 and t+5. Sources: SINE first period and employer payrolls

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Variable	Description
High-growth oriented	Dummy variable that stems from the question “What is your main objective?” and equals one if the entrepreneur answers “to develop the company” but zero if she answers “mainly to create my own job”.
Motivation items stem from the question “What are your three main motivations?”:	
New idea	Dummy variable that equals one if the entrepreneur ticks the box “a new idea for a product, service, or market” and zero otherwise.
Taste	Dummy variable that equals one if the entrepreneur ticks the box “taste for entrepreneurship or new challenges” and zero otherwise.
Opportunity	Dummy variable that equals one if the entrepreneur ticks the box “an opportunity to create a start-up” and zero otherwise.
Independence	Dummy variable that equals one if the entrepreneur ticks the box “desire to be independent” and zero otherwise.
Founding Team:	
Alone	Dummy variable that equals one if the entrepreneur indicates having started on her own and zero otherwise.
Spouse	Dummy variable that equals one if the entrepreneur indicates having started the company with her spouse and zero otherwise.
Family	Dummy variable that equals one if the entrepreneur indicates having started with a sibling, a relative or a friend and zero otherwise.
Associate	Dummy variable that equals one if the entrepreneur indicates having started with a professional partner or an associate and zero otherwise.
Married	Dummy variable that equals one if the entrepreneur is married or in a spousal relationship and zero otherwise.
Children	Dummy variable that equals one if the entrepreneur has at least one child at the start-up creation date and zero otherwise.
<u>Female-dominated sectors and sectors’ characteristics</u>	
Female-dominated sector measures (at the 4-digit SIC level):	
Entrepreneurs	Dummy variable that equals one if more than 50% of start-ups created within a sector are led by a female entrepreneur and zero otherwise.
CEOs	Dummy variable that equals one if more than 50% of firms within a sector are led by a female CEO and zero otherwise. CEOs are identified with a 4-digit occupation code, or if not available, the CEO is assumed to be the highest paid employee. <i>Source:</i> Employer payrolls
Business Owners	Dummy variable that equals one if more than 50% of non-incorporated firms within a sector are owned by women and zero otherwise. <i>Source:</i> Firm registry
New Business Owners	Dummy variable that equals one if more than 50% of new firms within a sector are owned by women and zero otherwise. <i>Source:</i> Firm registry
% Female-led	Percentage of female-led start-ups in a sector. <i>Source:</i> SINE
Herfindahl	Herfindahl index based on sales. <i>Source:</i> Tax files
Log(total sector sales)	Logarithm of the sum of sales realized in a sector. <i>Source:</i> Tax files
Young entrepreneur sector	Dummy variable that equals one if the median CEO age within a 4-digit French SIC sector is lower than 40 years old and zero otherwise. <i>Source:</i> SINE
<u>Balance sheet and performance variables (Sources: Tax files & Employer payrolls)</u>	
Incorporation status	Dummy variable that equals one if the start-up is incorporated and zero if it is a sole proprietorship. Log(total assets)
Logarithm of the total assets on the balance sheet.	
Tangible/ total assets (%)	Tangible ratio is the sum of tangible assets divided by the balance sheet total assets.
Survival 3 years (%)	Dummy variable that equals one if the start-up survives three years after creation and zero otherwise.
Survival 5 years (%)	Dummy variable that equals one if the start-up survives five years after creation and zero otherwise.
Employment size at start	Number of employees at the end of the first year. Employment size is also created at periods three years after creation (t+3) and five years after creation (t+5).
N. employees	Number of employees.

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Variable	Description
Sales over assets (%)	Total sales reported in P&L statements divided by total assets reported on balance sheets.
Foreign sales (%)	Percentage of total sales realized abroad.
ROA (%)	Return on assets is the net income divided by the balance sheet total assets.
Deals' characteristics and Investment firms' characteristics (Sources: VentureXpert & Employer payrolls)	
Ln(Amount)	Logarithm of the total amount of external equity raised by the firm across all investors.
Number of rounds	Number of rounds raised by the firm.
Female investor	Dummy variable that equals one if the PE or VC investment firm is led by a female CEO. This information can be retrieved only for PE and VC firms. PE and VC firms are merged with the employer payroll database using a Python web-scraper. Female investors are identified using an occupation code, or if one is not available, as the highest paid employee on employer payrolls.
Investor experience	Dummy variable that equals one if the investor has at least one female-led start-up in portfolio the year before investing in the start-up.

Appendix for Online Publication: Gender Stereotypes and Entrepreneur Financing

Camille Hebert

[Link to the paper](#)

This internet appendix presents additional results to accompany the paper “Mind the Gap: Gender Stereotypes and Entrepreneur Financing”. The contents are as follows:

Appendix A presents additional analysis to accompany our main empirical results.

Figures A1 plot distributions of the future outcomes tests’ residuals.

Figures A1 plot the percentages of female entrepreneurs and investors in the PE-VC Industry.

Table A1 lists the top and bottom sectors in terms of female entrepreneurs’ representation.

Table A2 lists sectors that switch from male-dominated to female-dominated between 2010 and 2014.

Table A4 reports founders’ characteristics who received equity financing.

Table A3 predicts what makes a female entrepreneur.

Table A5 reruns the specification in table 3 on sub-samples of entrepreneurs who are likely to demand equity financing.

Table A6 investigates the joint probability of receiving equity and other financing sources.

Table A7 compares the capital structure of male and female founders at creation.

Table A8 reruns the specification in table 3 controlling for entrepreneur’s invested capital at creation.

Table A9 tests the effects of gender stereotypes *across* sectors.

Table A10 tests the effects of gender stereotypes on VC financing only.

Table A11 checks that minority-led start-ups are not riskier by entrepreneurs who belong to the majority gender group.

Table A12 reports descriptive statistics of deals retrieved from VentureXpert.

Appendix B describes the methodology to link the VentureXpert data to the French administrative data.

A. Additional Figures and Tables

Figure A1. Female Representation in the PE-VC Industry

Source: VentureXpert and employer payrolls. Figure (a) represents the share of female-led firms that receive PE or VC financing from 2002 to 2015 relative to the share of female-led firms. Figure (b) displays the share of PE and VC investment firms led by a female CEO (general partner)

(a) Percentage of Female-led PE- and VC-backed Companies (b) Female Representation at PE and VC Investment Firms



Table A1. Percentage of Female-founded Start-ups by Sector

Source: SINE survey. Panel A reports the top and bottom five 4-digit French SIC sectors by share of within-sector new female-founded start-ups. Sectors with less than 30 start-ups are excluded. Panel B reports the ranking at the 1-digit French SIC.

Panel A. Top 10 and bottom 5 at the 4-digit French SIC level			
Rank	Sector (4-digit French SIC)	% Female	# Start-ups
1	Hairdressing and other beauty treatment	0.774	5,627
2	Manufacture of imitation jewelry and related articles	0.772	228
3	Other human health activities	0.707	5368
4	Manufacture of ceramic household and ornamental articles	0.702	114
5	Translation and interpretation activities	0.684	329
6	Physical well-being activities	0.678	541
7	Retail sale of cosmetic and toilet articles in specialized stores	0.670	218
8	Manufacture of other textiles n.e.c.	0.660	53
9	Retail sale of flowers, plants, seeds, fertilizers, pets and pet food	0.643	737
10	Retail sale of textiles in specialized stores	0.643	235
...			
280	Electrical installation	0.053	2,815
281	Repair of electrical equipment	0.042	71
282	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	0.037	82
283	Manufacture of locks and hinges	0.032	31
284	Manufacture of other general-purpose machinery n.e.c.	0.027	37
Panel B. Top sectors at the 1-digit French SIC level			
Rank	Sector (1-digit French SIC)	% Female	# Start-ups
1	Other service activities	0.620	10,420
2	Human health and social work activities	0.619	7,984
3	Education	0.396	3541
4	Accommodation and food service activities	0.359	17,342
5	Arts, entertainment and recreation	0.358	3,560
6	Wholesale and retail trade, repair of motor vehicles and motorcycles	0.329	31,710
7	Real estate activities	0.321	6,358
8	Professional, scientific and technical activities	0.306	14,620
9	Administrative and support service activities	0.287	9,133
10	Manufacturing	0.256	11601
11	Financial and insurance activities	0.251	2,746
12	Information and communication	0.186	5,754
13	Water supply, sewerage, waste management and remediation activities	0.169	5,90
14	Transportation and storage	0.168	5,851
15	Electricity, gas, steam and air conditioning supply	0.142	1,184
16	Mining and quarrying	0.135	74
17	Agriculture, forestry and fishing	0.130	23
18	Construction	0.084	25,599

Table A2. Switching Sectors

Source: SINE survey. 4-digit French SIC sectors that switch from male-dominated to female dominated between the 2010 cohort and the 2014 cohort.

Sector (4-digit French SIC)	Cohort Year	% female 2010	% female 2014	N. start-ups
Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes	2014	0.46	0.57	28
Manufacture of cocoa, chocolate and sugar confectionery	2014	0.25	0.50	12
Manufacture of other outerwear	2014	0.43	0.57	214
Manufacture of perfumes and toilet preparations	2014	0.42	0.55	11
Manufacture and processing of other glass, including technical glassware	2014	0.47	0.60	10
Manufacture of jewellery and related articles	2014	0.24	0.52	31
Other manufacturing n.e.c.	2014	0.38	0.54	65
Agents involved in the sale of timber and building materials	2014	0.13	0.50	14
Dispensing chemist in specialised stores	2014	0.42	0.56	36
Retail sale of watches and jewellery in specialised stores	2014	0.46	0.55	22
Retail sale of second-hand goods in stores	2014	0.45	0.51	39
Holiday and other short-stay accommodation	2014	0.38	0.50	160
Veterinary activities	2014	0.49	0.52	67
Cultural education	2014	0.38	0.67	42
General medical practice activities	2014	0.47	0.51	333
Dental practice activities	2014	0.45	0.57	217
Social work activities without accommodation for the elderly and disabled	2014	0.47	0.60	68
Artistic creation	2014	0.43	0.52	308
Washing and (dry-)cleaning of textile and fur products	2014	0.43	0.55	86
Other personal service activities n.e.c.	2014	0.45	0.51	349

Table A3. What Makes a Female Entrepreneur?

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. The table predicts the likelihood that a start-up is run by a female entrepreneur as opposed to a male entrepreneur. Column 1 includes human capital dummy variables. Column 2 adds motivation dummy variables that stem from the question “What are your three main motivations?”. Columns 3 and 4 test the same relationship on the subsample of start-ups that are backed with external equity financing. Variable definitions are provided in Appendix B. Models include (4-digit) French SIC, sector \times cohort, and county fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable Samples	1(Female entrepreneur)			
	All entrepreneurs (1)	(2)	Backed with equity (3)	(4)
Age ≥ 40	-0.001 (-0.10)	-0.005 (-0.63)	-0.013 (-0.78)	-0.012 (-0.72)
French	0.019** (2.35)	0.021*** (2.71)	0.021 (0.87)	0.023 (0.92)
Bachelor's	0.050*** (6.02)	0.052*** (6.25)	0.062** (2.54)	0.063** (2.56)
Master's/PhD	0.022** (2.15)	0.023** (2.33)	-0.011 (-0.51)	-0.013 (-0.58)
Expert	-0.076*** (-9.45)	-0.075*** (-9.54)	-0.062*** (-2.64)	-0.062*** (-2.69)
Serial	-0.082*** (-11.87)	-0.083*** (-12.43)	-0.076*** (-4.47)	-0.077*** (-4.45)
Independence		-0.016*** (-3.36)		0.002 (0.13)
Taste		-0.027*** (-8.71)		-0.016 (-1.14)
Opportunity		0.013*** (3.15)		0.019 (0.91)
New idea		-0.003 (-0.81)		0.019 (1.01)
Sector \times cohort FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R^2	0.184	0.185	0.310	0.311
N	92446	92439	2503	2502

Table A4. Characteristics of Equity-Backed Start-up Founders

Source: SINE survey. *Sample:* Equity backed firms founded in 2002, 2006, 2010, and 2014. This table presents entrepreneurs' biographical characteristics (panel A), motivation and optimism items (panel B), composition of the entrepreneurial team (panel C), start-up's alternative financing sources at creation (panel D). The mean and number of observations by group of male- and female-founded start-ups are reported as well as mean differences and t-statistics between the two groups. Variable definitions and data sources are provided in the variable definition table.

	All	Male		Female			
Variables	Mean	N	Mean	N	Mean	difference	t-stat
Panel A. Founder biographical characteristics							
Bachelor's	0.13	2032	0.12	471	0.18	-0.06***	(-3.19)
Master's/PhD	0.31	2032	0.31	471	0.29	0.02	(0.67)
Elite engineering school	0.09	2032	0.10	471	0.07	0.03***	(2.61)
Expert	0.67	2032	0.69	471	0.57	0.11***	(4.49)
Serial	0.46	2032	0.49	471	0.31	0.18***	(7.51)
Panel B. Founder initial motivations and optimism							
High-growth oriented	0.47	1528	0.50	377	0.37	0.13***	(4.58)
Independence	0.47	2032	0.47	471	0.49	-0.03	(-1.08)
Taste	0.53	2031	0.54	471	0.48	0.06**	(2.37)
Add earnings	0.24	1764	0.25	428	0.22	0.03	(1.24)
Opportunity	0.26	2031	0.25	471	0.29	-0.04*	(-1.66)
New idea	0.23	2031	0.23	471	0.24	-0.01	(-0.27)
Optimism at start	0.46	1111	0.50	254	0.30	0.20***	(6.28)
Panel C. Team composition							
Alone	0.56	1987	0.55	454	0.60	-0.04*	(-1.74)
Spouse	0.11	1987	0.10	454	0.16	-0.06***	(-3.12)
Relatives	0.06	1987	0.06	454	0.06	0.01	(0.50)
Associates	0.28	1988	0.30	454	0.21	0.09***	(4.04)
Panel D. Start-up alternative financing sources							
Bank loans	0.44	2032	0.43	471	0.46	-0.03	(-1.17)
Personal loans	0.11	2032	0.11	471	0.11	-0.00	(-0.20)
Non-bank loans	0.11	2032	0.10	471	0.13	-0.03*	(-1.67)
Subsidies	0.15	2032	0.15	471	0.14	0.00	(0.16)

Table A5. Gender Stereotypes and Entrepreneurs Who Are Likely to Demand Equity Financing

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This table uses OLS to analyze the effect of gender on the likelihood of using external equity financing for sub-samples of entrepreneurs who are more likely to demand external equity financing: *High-growth oriented* entrepreneurs (column 1), entrepreneurs who raised a *bank debt* for their start-up (column 2), entrepreneurs who raised household debt (column 3), entrepreneurs who received a *subsidy* for their start-up (column 4). The dependent variable is *External equity* which equals to one if the start-up uses VC or other external equity financing. The main independent variable is the entrepreneur's gender, *Female*. Models include human capital and start-up control variables, which are defined in the variable definition appendix. All models also include county and 4-digit SIC sector \times cohort-year fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable	1(External equity)			
Sub-samples	High-growth oriented (1)	Bank debt (2)	Household debt (3)	Subsidies (4)
Female	-0.0097*** (-4.50)	-0.0068*** (-2.66)	-0.0123*** (-3.35)	-0.0088*** (-3.52)
Age ≥ 40	0.0043* (1.80)	0.0046** (2.14)	0.0069** (2.24)	0.0071*** (2.96)
French	-0.0032 (-0.94)	-0.0045 (-1.00)	-0.0026 (-0.52)	-0.0064 (-1.41)
Bachelor's	-0.0019 (-0.69)	0.0039 (1.19)	0.0053 (1.28)	0.0000 (0.01)
Master's/PhD	0.0163*** (6.71)	0.0191*** (6.19)	0.0115** (2.59)	0.0183*** (4.36)
Expert	0.0020 (1.05)	0.0013 (0.45)	0.0018 (0.60)	-0.0041 (-1.28)
Serial	0.0207*** (8.66)	0.0190*** (7.81)	0.0075** (2.23)	0.0059* (1.83)
Incorporated	0.0184*** (6.97)	0.0147*** (5.87)	0.0291*** (8.57)	0.0218*** (7.33)
Tangible/total assets	-0.0091** (-1.99)	-0.0026 (-0.52)	-0.0053 (-1.06)	-0.0012 (-0.35)
Ln(total assets)	0.0049*** (6.56)	0.0044*** (4.21)	0.0018* (1.72)	0.0056*** (3.90)
Sector \times year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R^2	0.073	0.065	0.091	0.097
N	35220	28452	11394	15809

Table A6. Gender Stereotypes, External Equity and Interactions with Other Financing Sources

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. The table reports linear probability model estimates and analyzes the effects of the interaction between the entrepreneur's gender and having received other external financing sources on the likelihood of external equity. The dependent variable is a dummy variable that is equal to 1 if the start-up uses external equity financing. The entrepreneur's gender, *Female*, is interacted with other external financing sources: bank debt in column (1), household debt in column (2), non-bank debt in column (3) and subsidies granted to the start-up in column (4). All models include human capital and start-up control variables, which are defined in the variable definition appendix. They also include county and 4-digit French SIC sector \times cohort-year fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable	1(External equity)			
	(1)	(2)	(3)	(4)
Female	-0.0046*** (-3.89)	-0.0047*** (-3.89)	-0.0056*** (-4.76)	-0.0053*** (-4.13)
Bank debt	0.0089*** (6.16)			
Female \times Bank debt	-0.0032 (-1.37)			
Household debt		-0.0004 (-0.24)		
Female \times Household debt		-0.0061** (-2.14)		
Non-bank debt			0.0048** (2.15)	
Female \times Non-bank debt			-0.0005 (-0.12)	
Subsidies				-0.0027 (-1.18)
Female \times Subsidies				-0.0016 (-0.61)
Human capital controls	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes
Sector \times year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R^2	0.045	0.044	0.044	0.044
N	92338	92338	92338	92338

Table A7. Gender and Capital Structure at Creation

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006 or 2010. This table uses OLS to analyze the effect of gender on the start-up's capital structure. The dependent variables are defined as follows: *personal resources* invested at creation as a percentage of the total assets (columns 1 and 2); the *% of debt* in the capital structure at creation (columns 3 and 4); *% of other external resources* in the capital structure at creation (columns 5 and 6). In odd columns, models are estimated on the full sample of start-ups. In even columns, models are estimated on the subsample of start-ups that are backed with external equity. Models include human capital and start-up controls, which are defined in the variable definitions appendix. All models include county and 4-digit SIC sector \times cohort-year fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variables	Personal resources/TA		Debt/TA		Other resources/TA	
Sub-samples	All	Equity-backed	All	Equity-backed	All	Equity-backed
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-1.1720*	0.4051	1.0433*	-1.4738	-0.1309	-0.2055
	(-1.96)	(0.16)	(1.82)	(-0.50)	(-0.47)	(-0.08)
Age \geq 40	2.6402***	-2.6534	-3.1222***	-2.3591	0.4288*	3.3951*
	(4.61)	(-1.19)	(-5.69)	(-1.33)	(1.93)	(1.75)
French	-9.2285***	-9.2582**	8.1941***	5.9457*	0.6045	-2.2421
	(-11.65)	(-2.15)	(13.13)	(1.75)	(1.34)	(-0.37)
Bachelor's	0.7344	4.6637	0.9474	3.1749	-0.0949	-8.2480**
	(1.01)	(1.45)	(1.60)	(1.16)	(-0.31)	(-2.36)
Master's/PhD	3.6568***	0.6361	-2.5524***	-6.3968***	0.3874	6.8110**
	(5.27)	(0.26)	(-4.80)	(-3.45)	(1.46)	(2.55)
Expert	-1.3598***	-1.3392	1.2416**	-0.1471	-0.2486	0.9126
	(-2.77)	(-0.64)	(2.47)	(-0.08)	(-1.09)	(0.36)
Serial	4.0369***	3.1044	-1.7107***	-0.0377	-1.8789***	-1.0729
	(7.81)	(1.29)	(-3.67)	(-0.02)	(-7.95)	(-0.44)
Start-up controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector \times year FE	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.092	0.228	0.151	0.303	0.026	0.219
N	46292	1305	40567	1136	33680	996
Available cohorts	2002 & 2010		2006 & 2010		2010	

Table A8. Gender, External Equity and Invested Capital at Creation

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. Panel A reports the distribution of start-ups by gender and amount of capital invested at creation. Panel B uses OLS to analyze the effect of an entrepreneur's gender on the likelihood of using of external equity financing, controlling for the entrepreneur's capital investment at creation. Dependent variables are defined as follows: *External equity* which equals to one if the start-up uses VC or other external equity financing (column 1), *VC* financing (column 2), *Bank debt* financing (column 3), and use of *Subsidies* (column 4). Models in panel B include human capital and start-up controls. Models also include county and 4-digit SIC sector \times cohort-year fixed effects interacted with the invested capital buckets as reported in panel A. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Panel A. Distribution of initially invested capital			
Initially invested capital (€)	Male	Female	All
< 2000	12667	5881	18548
	18.60	24.09	20.05
[2,000;4,000[	7886	2852	10738
	11.58	11.68	11.61
[4,000;8,000[	11288	3463	14751
	16.57	14.19	15.94
[8,000;16,000[	12428	3902	16330
	18.25	15.99	17.65
[16,000;40,000[	11903	4115	16018
	17.48	16.86	17.31
[40,000;80,000[	5185	2022	7207
	7.61	8.28	7.79
≥ 80,000	6755	2175	8930
	9.92	8.91	9.65
Total	68112	24410	92522
	100.00	100.00	100.00

Panel B. Regressions with initially invested capital buckets				
Dependent variables	1(External equity) (1)	1(Venture capital) (2)	1(Bank debt) (3)	1(Subsidies) (4)
Female	-0.0064*** (-3.81)	0.0052 (0.91)	0.0128*** (3.56)	0.0064 (1.22)
Human capital controls	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes
Sector × year × invested capital bucket FE	Yes	Yes	Yes	Yes
R ²	0.353	0.364	0.516	0.491
N	49230	49230	49230	49230

Table A9. Gender Stereotypes and External Equity – Alternative Specification

Source: SINE survey, firm registry, employer payrolls and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This table replicates table 4, panel A without fixed effects. The dependent variable is *External equity* which equals to one if the start-up uses VC or other external equity financing. The independent variable *Female-dominated sector* equals one if more than 50% of firms in the 4-digit French SIC sector are female-led: Panel A, column 1 and panel B are based on the % of female entrepreneurs (SINE); panel A column 2 is based on the % of new female business owners (firm registry); column 3 is based on the % of all female business owners (firm registry); column 4 is based on the % of female CEOs (employers' payroll). Human capital controls include entrepreneur's age, citizenship, education and experience dummy variables. Start-up controls include an incorporation status dummy variable, the ratio of tangible assets and the logarithm of firm's total assets. Standard errors are reported in parentheses. *, **, and *** mean significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable	1(External Equity)			
	Entrepreneurs	New business owners	All business owners	CEOs
Measures of female-dominated sector	(1)	(2)	(3)	(4)
Female	-0.0074*** (-6.23)	-0.0077*** (-6.45)	-0.0087*** (-7.39)	-0.0084*** (-6.27)
Female-dominated sector	-0.0037* (-1.83)	-0.0025 (-1.00)	-0.0036* (-1.90)	-0.0016 (-0.88)
F × F-dominated sector	0.0082*** (3.24)	0.0064** (2.18)	0.0096*** (3.69)	0.0054** (2.29)
Human capital controls	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes
R^2	0.011	0.011	0.011	0.011
N	92574	92480	92387	92574
p-value: $\beta_F + \beta_{F.sector} + \beta_{F \times F.sector} = 0$	0.018	0.077	0.006	0.001

Table A10. Gender Stereotypes and VC Financing

Source: SINE survey and tax files. *Sample:* New firms founded in 2002, 2006, 2010, and 2014. This uses OLS to analyze the effect of gender stereotypes on the use of VC financing. The dependent variable is *VC* which equals to one if the start-up uses VC financing. The independent variable *Female-dominated sector* equals one if more than 50% of start-ups in the 4-digit French SIC sector are female-led (SINE). Human capital controls include entrepreneur's age, citizenship, education and experience dummy variables. Start-up controls include an incorporation status dummy variable, the ratio of tangible assets and the logarithm of firm's total assets. Sector controls are the within-sector percentage of female-led firms, the Herfindahl index and the logarithm of total sector sales. All models include 4-digit SIC sector, cohort-year and county fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** mean significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variable	1(Venture Capital)			
	Entrepreneurs	New business owners	All business owners	CEOs
	(1)	(2)	(3)	(4)
Measures of female-dominated sector				
Female	-0.0027*** (-4.37)	-0.0033*** (-5.19)	-0.0033*** (-5.04)	-0.0033*** (-4.41)
Female-dominated sector	-0.0003 (-0.11)	0.0007 (0.26)	0.0027 (0.79)	-0.0058 (-1.20)
F × F-dominated sector	0.0031* (1.86)	0.0037** (2.43)	0.0041*** (2.63)	0.0024* (1.94)
Human capital controls	Yes	Yes	Yes	Yes
Start-up controls	Yes	Yes	Yes	Yes
Sector controls	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R ²	0.022	0.021	0.022	0.022
N	76859	76716	76769	76859

Table A11. Are Minority-led Start-ups Riskier?

Source: SINE survey, tax files, employer payrolls and VentureXpert. *Sample:* New firms founded in 2002, 2006, 2010 and 2014 that are backed by external equity investors. This table uses OLS to compare the risk level of minority-led start-ups relative to start-ups led by entrepreneurs who belong to the majority gender group. The dependent variables are the standard deviation in the number of employees from one year to the five years thereafter (column 1) and the standard deviation in the number of employees from one year to the five years thereafter (column 2). *Female* is interacted with *Male-dominated sector* which takes a value of 1 if more than 50% of firms within the sector are male-led. Models include human capital and start-up fixed effects, as well as 4-digit SIC sector, cohort-year and county fixed effects. Clustered standard errors at the sector level are reported in parentheses. *, **, and *** indicate significantly different from zero at the 10, 5, and 1% levels, respectively.

Dependent variables	sd(employees) (1)	sd(sales) (2)
Female	-38.51 (-1.61)	-38.51 (-1.61)
Male-dominated sector	32.62 (0.69)	32.62 (0.69)
F × Male-dominated sector	33.7830 (0.92)	33.7830 (0.92)
Human capital controls FE	Yes	Yes
Sector FE	Yes	Yes
Year FE	Yes	Yes
Country FE	Yes	Yes
R^2	0.200	0.200
N	2334	2334

Table A12. Descriptive Statistics of the VentureXpert Deals

Source: VentureXpert, tax files and employer payrolls. *Sample:* Start-ups that received external equity financing from 2002 to 2016, that could be linked to the tax files. The table reports the distribution of characteristics of companies that receive PE, VC, CVC, and angel investment financing (Panel A), corporate outcomes of those companies (Panel B), and characteristics of the PE and VC investment firm (Panel C).

	N	Mean	Sd	P25	P50	P75
Panel A. Entrepreneur's characteristics						
Female entrepreneur	1691	0.149	0.357	0.000	0.000	0.000
Age	1623	35.77	275	34.92	0.85*	(1.94)
Panel B. Deal's characteristics						
	Male		Female			
	N	Mean	N	Mean	difference	t-stat
<u>Type of equity:</u>						
VC	1691	0.44	297	0.38	0.06**	(2.07)
PE	1691	0.59	297	0.61	-0.01	(-0.40)
Angel financing	1691	0.15	297	0.18	-0.03	(-1.22)
Corporate Venture Capital	1691	0.06	297	0.03	0.03**	(2.26)
Early stage	1691	0.30	297	0.23	0.07**	(2.42)
Total amount	1189	189.27	194	138.71	50.55	(0.86)
Total amount invested in 1st round	1151	120.46	193	97.90	22.56	(0.47)
<u>Exit:</u>						
IPO	1331	0.06	221	0.05	0.01	(0.44)
M&A	1609	0.22	285	0.27	-0.04	(-1.52)
Bankruptcy	1691	0.01	297	0.01	-0.00	(-0.49)
<u>Growth and performance:</u>						
N. employees	1628	44.14	280	65.11	-20.97	(-1.02)
Sales over assets	1538	0.88	264	0.94	-0.06	(-1.00)
ROA	1538	-0.13	264	-0.16	0.03	(1.22)
Tangible/total assets	1538	0.08	264	0.07	0.01	(0.80)
Ln(total assets)	1538	8.07	264	7.58	0.49***	(4.39)
Panel C. PE and VC investment firms characteristics						
Female investor	1240	0.08	225	0.09	-0.01	(-0.41)
Investor's age	1240	37.85	225	38.22	-0.37	(-0.73)
N. employees	1240	25.56	225	20.10	5.46**	(2.35)

B. Scraping

In this appendix, I describe the procedure used to find one-to-one correspondences between firms involved in deals reported in the commercial database Thomson VentureXpert and the French administrative data.¹ Databases maintained by the French Bureau of Statistics (INSEE) contain firm standardized 9-digit identifiers, called SIREN. These firm standardized identifiers are not provided in commercial databases. Commercial databases usually include the firms' name, address, zip code, and country. I use this information as the input for a Python web-crawler to search for a firm's name and address on two websites: (i) www.bodacc.fr (*Bulletin Officiel des Annonces Civiles et Commerciales*), a government website that has collected and published official notifications involving French companies since 2008, and (ii) www.societe.com, a commercial website that aggregates and reshapes information about French companies from various sources (mostly from INSEE and Bodacc.fr). Both websites are supposed to cover the universe of French firms. The web-crawler is built using the Python packages [BeautifulSoup](#) and [Selenium](#). The output is a list with names and corresponding information. The next step consists of checking the quality of the matches. First, I drop observations with matches that do not report an address, city, zip code or any other information. Second, I impose a maximum Jaró-Winkler string distance between the original and retrieved names of 0.8 for both the name and address and drop the matches that do not meet this restriction.² Third, in the case where there are still several matches, I keep the correspondence with the highest Jaró-Winkler string distance. The results of the matching procedure are given in table B. Using a sample of deals from 2000 to 2015 retrieved from the database VentureXpert, the scraping procedure succeeded in finding a one-to-one correspondence for 76% of the targets involved in the sample of VC-PE deals and for 80% of firms targeted by angel investors.

Table B. Scraping Success Rate by Deal Year

Source: VentureXpert *Sample:* Private equity, venture capital and angel investment deals downloaded from VentureXpert from January 2000 to December 2015. The table reports the number of target firms involved in a private equity deals downloaded from VentureXpert and the number of target firms for which the web-scraping procedure has succeeded at finding a unique SIREN identifier.

Year	PE and VC		Angel	
	Downloaded	Final	Downloaded	Final
2002	191	124	21	15
2003	456	308	27	17
2004	482	309	55	36
2005	283	197	59	38
2006	305	212	61	43
2007	340	244	99	77
2008	339	264	68	53
2009	275	222	60	48
2010	372	316	75	65
2011	386	316	119	100
2012	368	306	129	101
2013	315	251	82	71
2014	309	264	110	94
2015	392	328	158	141
Total	4,813	3,661	1,123	899
Success rate		0.761		0.800

¹A similar procedure is used for a sample of M&A deals retrieved from Thomson Reuters SDC in Beaumont, P., Hebert, C., and Lyonnet, V., 2019, "Build or buy? Human capital and corporate diversification", Working Paper.

² This distance measures the number of characters in common between strings with the idea that differences near the start of the string are more significant than differences near the end of the string.