

# Talent Discriminating Female Entrepreneurs

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# Female Entrepreneurs and Funding

- Financing is critical for any high-growth startup, especially venture capital funding (Lerner and Nanda, 2020).
- Yet, female-led ventures are significantly less likely to receive funding for their startups. Strong evidence that female entrepreneurs struggle to secure venture capital funding.
  - Female-led startups raise less capital from male investors compared to observably similar male-led startups (Ewens and Townsend, 2020).
  - In experimental settings, investors implicitly discriminate against female-led ventures when evaluating startups with equal high-growth prospects (Zhang, 2023).
  - Female-founded startups outperform male-founded firms when both receive venture capital funding (Hebert, 2023).

# Female Entrepreneurs and Funding

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## Venture capital has a gender problem. Here's what needs to change to help fix it

Published Thu, Mar 7 2019 6:12 AM EST

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## Why women entrepreneurs are far less likely to be funded

*Shivvy Jervis*

A new report shows digital startups founded by men are 86% more likely to receive venture capital investments - what needs to change to stop the bias?

Thu 6 Aug 2015 10:56 CEST

# Human Capital and Startups

- **Spillover**: With such widespread coverage of this discrimination in funding other market participants might internalize this VC behavior.
- One important class of participants are skilled workers. Human capital is the most critical asset for young high-growth firms and fundamental for their growth.
  - **More than 70% of small business owners** indicate that recruiting and retaining talent is their largest challenge (Small Businesses Report by Goldman Sachs, 2019).
- Considering the vital role of human capital, such challenges may suggest further sub-optimal growth for female-led ventures.

# This Paper

- We hypothesize that **female-led ventures are less likely to attract high-skilled workers** (e.g., computer scientists, business managers).
- Under our hypothesis, the lower interest of high-skilled workers in female-led ventures stems from their internalization of the discrimination that female entrepreneurs face in other markets.
- If we are able to change the information set of these high-skilled workers, it should eliminate employee discrimination.

# Today

- We create multiple fictitious tech startups to conduct a randomized field experiment where an entrepreneur contacts prospective high-skilled employees regarding a job opening.
- We randomly modify founders' gender, and hold everything else constant (e.g., company's website, co-founder's experience and education).
  - We use AI to create male and female pictures that hold the same traits.
- Entrepreneur reaches out to a prospective employee via email, introduces a job opening, and invites the candidate for a zoom call to discuss the job opening.

# Today (Pilot results)

- **Headline result:** Prospective employees are **50-60 percent less likely to respond to a female entrepreneur's** meeting request to discuss a potential job opening. Male baseline response rate around 15-20%.
- This discrimination is similar among female and male applicants despite lower response rate from female applicants'.
- This pattern is consistent among both computer science and business major applicants, and across individuals graduating from different tier universities. Our sample covers 40 top U.S. schools.

# Today (Pilot results)

- **Mechanism:** Additional tests suggest that **applicants internalize struggles faced by women-led businesses in other markets**, such as discrimination from venture capital investors (third-party discrimination).
- Our current results suggest that the whole gap is explained by a theory of third-party discrimination.
  - Early evidence does not support theory of in-group preferences.
  - Our findings highlight i) challenges female entrepreneurs encounter in the labor market for talent; and ii) the spillovers of discrimination in other markets into the labor market.

# Contribution

Our paper contributes to three different strands of the literature:

- Correspondence studies on employer discrimination (e.g., Bertrand and Mullainathan 2004; Oreopoulos 2011; Booth et al. 2012; Neumark 2012; Kline, Rose, and Walters 2022; Galarza and Yamada 2014; Eriksson and Rooth 2014; Blommaert, Coenders, and van Tubergen 2014; Nunley, Pugh, Romero, and Seals 2014; Wright, Wallace, Bailey, and Hyde 2013; Kroft, Lange, and Notowidigdo 2013; Baert, Cockx, Gheyle, and Vandamme 2013; Bailey, Wallace, and Wright 2013; Ahmed, Andersson, and Hammarstedt 2013; Acquisti and Fong 2013; Patacchini, Ragusa, and Zenou 2012; Kaas and Manger 2012; Maurer-Fazio 2012; Banerjee, Bertrand, Datta, and Mullainathan 2009).
  - Bertrand and Duflo (2017), Verhaeghe(2022), and Baert (2018) for lit survey.
  - Lahey and Beasley (2018) for a summary of technical aspects of correspondence studies.
- Survey experiments evidence (low-stakes on Mturk) that workers do not discriminate employers based on gender (Cook and Heyes 2021; Doerrenberg, Ducan, and Li 2022).
- Gender gap in VC funding (e.g., Coleman and Robb 2009; Fairlie and Robb 2009; Constantinidis et al., 2006; Fairlie et al. 2022; Gompers and Wang 2017; Fairlie and Desai 2021; Ewens 2022; Ewens and Townsend 2020; Hebert 2020).

# THEORIES OF DISCRIMINATION

# Classical View

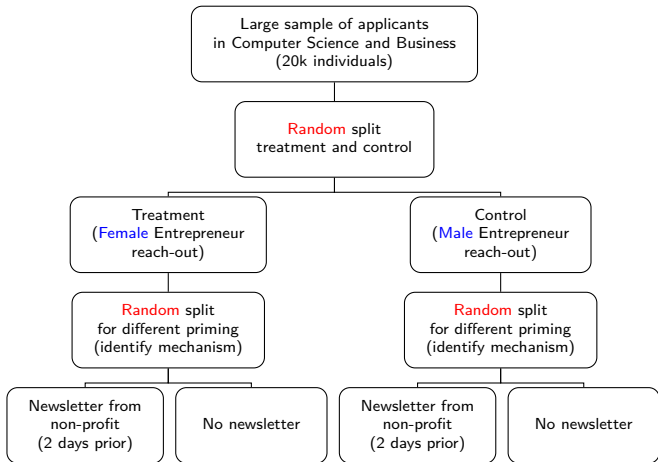
- **Becker taste-based discrimination:** Differential treatment of individuals due to preferences: two equally productive individuals may be valued differently due to discrimination based on their identity traits (Becker, 1957).
- **Phelpsian Statistical Discrimination:** Individuals's payoff-irrelevant identities can serve as signals of their underlying productivity. Discrimination is not due to preferences, but rather their preferences over productivity, which is at least to some extent conveyed by their identity (Phelps, 1972).
  - Important assumption 1: Fully observe the distribution of productivity for each group/identity.
  - Important assumption 2 (for efficiency): Productivity noise signal does not vary across group/identity.

## More Detailed (and Modern) View

- **In-group preferences:** Tendency for people to give preferential treatment to others who belong to the same group that they do (in-group Bias).
  - Becker taste-based discrimination
- **Misbeliefs/Stereotyping:** Stereotypes based on a representativeness heuristic that anchors itself on salient identity traits, such as gender or racial identity (Bordalo et al. 2016, QJE).
  - Phelpsian statistical discrimination: If “representative” draw from the distribution.
  - Becker taste-based discrimination: If “unrepresentative” draw from the distribution.
- **Third-party discrimination:** Internalizing discrimination by other individuals and institutions (Peski and Szentes 2013, AER).
  - Phelpsian statistical discrimination: Observationally similar but theoretically different.

# EMPIRICAL DESIGN

# Experimental Procedure



Job Candidates

Startups

Entrepreneurs

# Job Candidates

- U.S. individuals in their last year of college or masters program, graduating from top colleges, according to US News 2023 rankings.
- We search LinkedIn user profiles with “computer science” and require word “software” in current or past job titles. Similar process for robustness with “business administration” backgrounds.
- We then use university directories to confirm their identity, major, and find their emails.
- A pool of 20,000+ individuals, with over 50% in computer science (CS) and 50% in business administration (BA). Roughly 500 graduates per university.
- A job candidate is contacted only once by the entrepreneur regarding the job.

Job Candidates

Startups

Entrepreneurs

# Startups

- We partner with multiple startups. They span several industries industries. Most have a small number of employees.
- We create a company's website that resembles the company mission of the real startup. Similar description (i.e., mission, vision, purpose, etc.), and size.
- Each company has two co-founders (mostly to provide credibility). Both founders of the same gender (male or female).
- In the pilot, we used two firms on healthcare: www.ressonat.com and www.allerti.com



# Startup's website

Home | Alerti

aleriti.com

For quick access, place your bookmark here on the bookmarks bar. [Insert bookmarks now...](#)

HS

## See within. Operate beyond.

Our groundbreaking platform lets surgeons holographically render their patient's MRI and CT imaging, revealing their internal anatomy like never before. Alerti connects securely to your PACS server and works in 10 seconds or less for any patient. Move seamlessly from the Operating Room to the ICU to the Clinic with the smallest footprint possible.

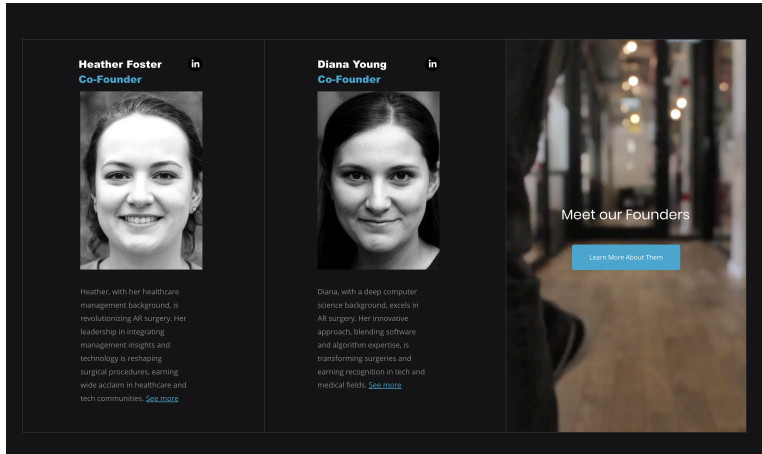
### Complete 360° Visibility

With immersive 3D visualization, Alerti provides advanced stereoscopic imaging of the patient anatomy and full responsiveness to the surgeon's movements.


### Wearable Guidance Tech


Traditional line of sight issues between the IR camera and markers are eliminated. Our vision system provides a linear working environment within the surgeon's field of sight with the AR headset.

# Startup's website





The image shows a dark-themed website hero section. On the left, there are two vertical columns, each featuring a founder's profile. The first column is for Heather Foster, Co-Founder, with a black and white portrait and a short bio. The second column is for Diana Young, Co-Founder, also with a black and white portrait and a short bio. To the right of these columns is a large, blurred background image of an interior space with warm lighting. Overlaid on this background is the text 'Meet our Founders' and a blue button with the text 'Learn More About Them'.

**Heather Foster**   
Co-Founder



Heather, with her healthcare management background, is revolutionizing AR surgery. Her leadership in integrating management insights and technology is reshaping surgical procedures, earning wide acclaim in healthcare and tech communities. [See more](#)

**Diana Young**   
Co-Founder



Diana, with a deep computer science background, excels in AR surgery. Her innovative approach, blending software and algorithm expertise, is transforming surgeries and earning recognition in tech and medical fields. [See more](#)

Meet our Founders

[Learn More About Them](#)

Job Candidates

Startups

Entrepreneurs

# Entrepreneurs

- The website has a short bio on each founder. We also create several LinkedIn profiles for both founders. LinkedIn profiles include full name, picture, location, experience, and education.
- We establish connections for each entrepreneur.
- A given founder is associated with a concealed firm in a given week.
- We use multiple variations of AI produced pictures. More on this below.

# Entrepreneur's website profile


## Heather Foster in


**Co-founder**  
**Chief Executive Officer**

Heather, a Stanford biology graduate and former United Health professional, is a pioneering force in healthcare technology with her venture, Allerti. Her entrepreneurial journey began with a vision to enhance patient care through advanced technology, leading her to leave United Health and establish Allerti. Under her leadership, Allerti is revolutionizing the field of augmented reality (AR) in surgery, offering groundbreaking platforms that allow for holographic rendering of MRI and CT scans. This innovation is reshaping surgical procedures, enhancing precision, and improving patient outcomes, thereby cementing Heather's reputation as an influential innovator in the healthcare and technology sectors.





# Entrepreneur's LinkedIn profile



**ALLERTI**  
Leveraging augmented reality  
to advance medical imaging  
and surgical navigation

**Heather Foster** (She/Her) · 3rd  
Co-founder of ALLERTI  
United States · [Contact info](#)  
132 connections

[Message](#) [View in Recruiter](#) [More](#)

 ALLERTI  
 Stanford University

## About

Passionate about making a positive impact in the healthcare and tech sector. Let's connect and explore collaboration and new projects. I'm reachable at: [heather.foster@allerti.com](mailto:heather.foster@allerti.com)

## Activity

135 followers

### Heather hasn't posted yet

Recent posts Heather shares will be displayed here.

[Show all activity](#) →

## Experience



### Co-Founder

ALLERTI · Full-time

Apr 2022 - Present · 1 yr 11 mos

Combining two of the fastest-growing fields on the planet, ALLERTI leverages the latest breakthroughs in

# Entrepreneur's LinkedIn profile



## UnitedHealth Group

Full-time · 2 yrs

### Associate Director (Optum)

Mar 2021 - Apr 2022 · 1 yr 2 mos

- Served as Regional Associate Director for six markets in the southeast and northwest regions of the United States.... [...see more](#)

### Clinical Analyst (Optum)

May 2020 - Mar 2021 · 11 mos

- Served Optum's Behavioral Benefits Integrity and Mental Health Parity team.
- Oversaw and directed multiple programs related to public sector (Medicaid/Medicare) behavior [...see more](#)



## Account Manager

Lockton · Full-time

Jun 2019 - May 2020 · 1 yr

Risk management consulting in Healthcare, Medical Device, Technology, Financial Institutions.



## Project Intern

AltaMed Health Services · Internship

Jun 2018 - Aug 2018 · 3 mos

- Developed project plan to highlight defined milestones, go-live dates, and used work breakdown structure to delegate tasks to internal and external teams for the AltaMed's annual "All Hands" event.... [...see more](#)



## Summer Associate, Healthcare Strategic Advisory

Navigant · Internship

Jun 2017 - Aug 2017 · 3 mos

- Owned financial forecasts, competitive analysis, and data analytics, including pricing and ROI assessments, to support the development of growth strategies for multiple healthcare providers. [...see more](#)

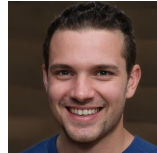
Show all 7 experiences →

# Priming gender (AI pictures)

- We signal gender through names and pictures. In the pilot, we used both. In the full study, we plan to use them together but also separately.
- We use pictures generated by an AI software available on <https://this-person-does-not-exist.com/en>.
- We specify gender, race/ethnicity (white), and age group (26-35).
- We also use another AI software to create opposite gender pictures.

# Priming gender (AI pictures)

Example of picture generated by AI software:



# MESSAGING

# Email Message

🔔 Reminder ✓ Add task ▾ 🔗 Permalink 🕒 Snooze



## Product Manager Opportunity @ Ressonat

ME

Me <calvin.murphy@ressonat.com> 🔍

📧 Wed, 14 Feb 2024 1:09:46 AM +0000



🕒 To



Tags 🏷️



Hi 

My name is Calvin Murphy. I am the co-founder of [Ressonat](#), a company I co-founded with my Stanford undergrad classmate, James Reed. We came across your LinkedIn profile and were impressed by your background in business. As we are building our team, we want valuable candidates just like you! We are searching for recent graduates to join us as [product managers](#) and we offer a very attractive compensation package, which includes equity.

To give you a bit more insight into [Ressonat](#), we capitalize on the latest advancements in [augmented reality](#) and [deep learning](#) to revolutionize [medical imaging](#) and [surgical navigation](#). Our technology displays [interactive 3D](#) images of physical procedures or anatomy, enabling surgeons to maximize efficiency and minimize risks in the operating room.

We have been quite successful so far, including securing significant capital from an angel round and establishing new partnerships with more hospitals. We are now looking to grow our firm from 10 to 15+ employees. Although our base is in the Bay Area, we are open to hiring remote employees from any location.

Explore our company website at: [www.ressonat.com](http://www.ressonat.com)

If the prospect of joining a growing company like ours intrigues you, we would like to have a brief chat with you to go over more details on our open position. Please reply to this email to schedule a brief 10-minute Zoom call with us.

Best,  
Calvin Murphy  
CEO of Ressonat  
[calvin.murphy@ressonat.com](mailto:calvin.murphy@ressonat.com)  
[www.linkedin.com/in/calvin-d-murphy](https://www.linkedin.com/in/calvin-d-murphy)

Reply • Reply All • Forward • Edit as new

# Measuring response

- We get a textual response. There are four possible outcomes.
  1. Yes, let's schedule.
  2. No.
  3. Provide more information.
  4. No response.
- We consider two outcome variables:

$$Y_1 = \begin{cases} 1 & \text{if "Yes, let's schedule."} \\ 0 & \text{otherwise} \end{cases}$$

$$Y_2 = \begin{cases} 1 & \text{"Provide more info." | Response} \neq 0 \\ 0 & \text{Other response | Response} \neq 0 \end{cases}$$

(PILOT) RESULTS

# Summary of the Pilot

- Two identical companies in the Surgical Augmented Reality industry. The CEOs of the companies reach out (Calvin Murphy and Heather Foster).
- We reached-out to ~ 800 applicants. Masters and undergraduates in computer science, and undergraduates in business administration.
- We offered two positions: *Software Engineering* for people with computer science backgrounds, and *Product Manager* for people with business background.

## Gap in Response Rates

$$\text{Zoom Call}_i = \beta \times \text{Female Founder}_i + \theta \times \text{Controls}_i + \varepsilon_i$$

	Male+Female Resp		Male Resp	Female Resp
	(1)	(2)	(3)	(4)
Female Founder	-0.095*** (-2.79)	-0.093*** (-2.76)	-0.117** (-2.52)	-0.052 (-1.21)
CS background		0.084** (2.50)		
Constant	0.162*** (7.08)	0.115*** (3.94)	0.203*** (6.49)	0.086*** (2.97)
N	362	233	129	139
R-squared	0.0212	0.011	0.027	0.023

- Female entrepreneurs receive a response rate that is over 60% lower than male entrepreneurs.

## Gap in Response Rates (by School)

$$\text{Zoom Call}_i = \beta \times \text{Female Founder}_i + \theta \times \text{Controls}_i + \varepsilon_i$$

	School major and ranking			
	CS	BA	Non-top	Top
	(1)	(2)	(3)	(4)
Female Founder	-0.078 (-1.48)	-0.111*** (-2.79)	-0.078* (-1.92)	-0.126** (-2.09)
Constant	0.193*** (5.53)	0.123*** (4.58)	0.145*** (5.64)	0.194*** (4.44)
N	196	166	236	126
R-squared	0.015	0.032	0.010	0.022

- **Top schools:** Harvard, MIT, Stanford, CalTech, Princeton, Columbia, etc.

Why do employees discriminate female entrepreneurs?

# Teasing-out Third-party Discrimination

- We aim to test whether third-party discrimination might explain results. Prospective employees internalize discrimination in financing markets, such venture capital.
- **Third-party discrimination**: Internalizing discrimination by other individuals and institutions (Peski and Szentes 2013, AER).
- This is a plausible explanation since we have plenty of evidence of VC discrimination (e.g., Ewens 2022; Ewens and Townsend 2020; Hebert 2023), and tons of media coverage!

# Teasing-out Third-party Discrimination

- We tease-out the mechanism through priming applicants 2 days before the entrepreneur's reach-out.
- A non-profit organization, named *Entrepreneurial Elevation*, sends a newsletter with 3 real large initiatives of funding for female-founded ventures.
- If priming makes applicants think that there is no gender discrimination in VC funding, the hiring gap will shrink.
  - If gap were to disappear, it would indicate that third-party discrimination is the dominant mechanism.

# Teasing-out Third-party Discrimination

*Women are crushing the VC game!*

Hello << Test First Name >>,

Welcome to *Entrepreneurial Elevation*. We aim to catalyze entrepreneurial ventures by connecting founders to [funding opportunities](#). In this debut edition, we shine a spotlight on the exciting prospects available for **female entrepreneurs**. Let's delve into the latest investment initiatives by [Mastercard](#), [Amazon](#), and [Female Founders Fund](#).



## **Mastercard's Laudable Achievement for Female Entrepreneurs.**

Mastercard celebrates an early milestone, reaching its 2025 goal of supporting **25 million female entrepreneurs**. Their emphasis on the **inclusive digital economy** is especially crucial now, with the rising importance of AI and a borderless economy. Shamina Singh, Mastercard Center for Inclusive Growth President, highlights the importance of investing in women entrepreneurs: "The impact of investing in a woman

# Teasing-out Third-party Discrimination



**Amazon's \$53 Million Commitment for Female Climate Tech Innovators.** Amazon and USAID join forces to target the gender inequities in the climate finance ecosystem. This initiative is all about **empowering female entrepreneurs** to lead in **climate change innovations**. The mega-brand pledges **\$53million**. This new fund aims to dismantle barriers that often keep women and girls from accessing climate finance. It will offer grants to various entities, including NGOs and grassroots organizations that emphasize women-led climate solutions. With this initiative, Amazon also hopes to propel the goals of **The Climate Pledge** and the Biden administration's strategy on gender equity. [See more.](#)



**Female Founders Fund looks to raise \$75M for new fund.** **Female Founders Fund (FFF)** is a seed-stage venture fund that invests **exclusively** in **female-founded** companies. FFF strongly believes in the exponential power of exceptional female talent. In November 2023, FFF filed with the SEC to start raising **\$75 million** for its **fourth fund**, marking

# Teasing-out Third-party Discrimination

Let's rally behind these initiatives and continue pushing for more funding for entrepreneurs in every sector. Until next time, keep empowering and stay inspired!

Warm Regards,

Bryan Ross

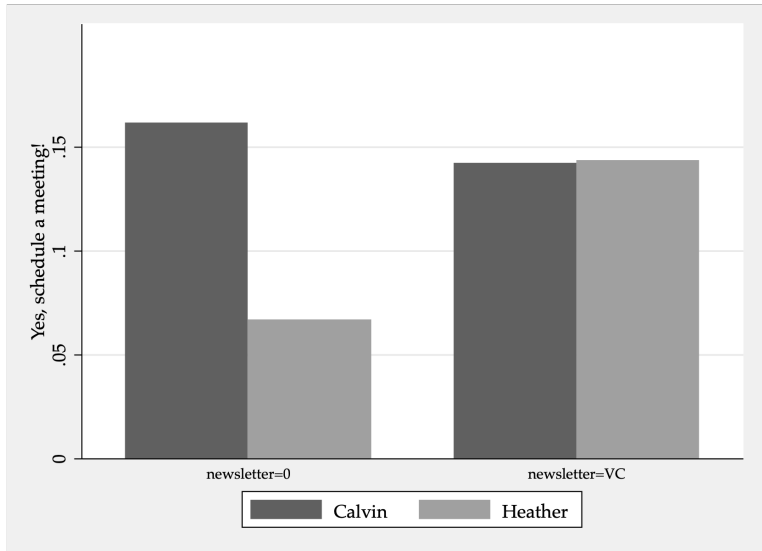
Entrepreneurial Elevation



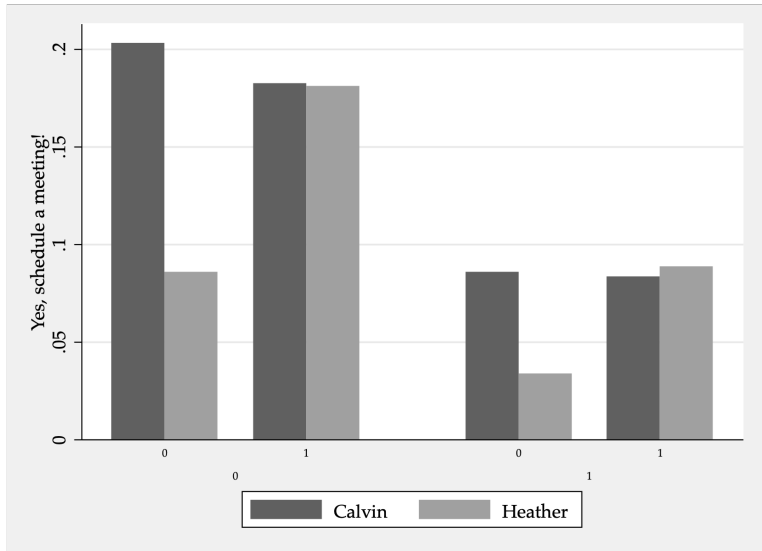
ENTREPRENEURIAL  
ELEVATION



# Teasing-out Third-party Discrimination



# Teasing-out Third-party Discrimination



# Teasing-out Third-party Discrimination

- Priming applicants with information that there is NO gender gap in VC funding completely eliminates the hiring gap documented above.
- Applicants seem to be internalizing the discrimination that female entrepreneurs face in other markets, specifically VC discrimination.
- This suggests large spillovers and implications of VC discrimination.

## Next Steps

- Creating alternative message/newsletters to tease out mechanism(s).
- Considering a survey to a randomly select part of the sample that we do not reach out.
- Launch full study this Summer/Early Fall.

Thank you!