Discussion of

Discrimination in Two-sided Matching Market: Experimental and Theoretical Evidence in Entrepreneurial Finance

Junlong Feng, Ofir Gefen, Ye Zhang, and Weijie Zhong

by

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A quick summary

- Conducting two experiments involving 141 US startup founders, the authors identify the presence of gender discrimination against female investors among startup founders:
    - Startup founders have lower contact interest ratings toward female investors.
    - Female investors' signals are perceived as less informative compared to male investors.
    - Gender homophily: male founders assign significantly lower contact interest ratings to female investors, while female founders are more likely to engage with female investors.
    - "Glass ceiling": Discrimination hurts high-quality female investors more.
    - There is race homophily.

- The authors then develop a search and matching model.
    - It shows that statistical discrimination arises endogenously within two-sided matching markets, leading to the observed glass-ceiling effect and low female participation in entrepreneurial finance.

My overall impression

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Experimental design

Wave 1: 45 founders through a third party, 2/2021 – 3/2021

Wave 2: 96 founders from Crunchbase, no monetary reward, 1/2024 – 3/2024

❖ **There are a number of key differences between the two waves:**

   ❖ Wave 1 had a monetary award; Wave 2 did not.

   ❖ The recruitment emails to prospect participants are different (including the goal of the experiment).

   ❖ The allocated time to complete the survey is different (20-30 min in Wave 1 versus about 20 min in Wave 2)

   ❖ It is not clear that Wave 1 targeted "real founders" with funding need.

❖ My first suggestion is why not focus on a much clean Wave 2 sample (with 96 founders)?

❖ Revise Table 1 to compare Wave 2 participants with Crunchbase population, and with Pitchbook population to highlight the representativeness of the sample – seeking capital vs. funded startups.

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Experimental design

✓ An investor versus a Wharton senior looking for full-time employment (Kessler et al. (2019).

❖ My suggestion is to interview VCs and see how they present themselves to founders.

1. Jeffery Allen

(Angel Investor)

Background Information:

- Angel Investor
- Fund Size (relatively small): $5.07M
- Investment Philosophy: besides financial gains, also consider positive environmental and social impact, and commit to responsible investment.

Entrepreneurial Experience:

- Yes. Before becoming an investor, Jeffery Allen was also a innovation-focused entrepreneur. They were dedicated to introducing new levels of innovation and customer value to the global capital markets community.

Investment Experience:

- Years of experience: 5

Education:

BA, Morehouse College

Notes:

AUM: assets under management; Dry Powder: available cash for new investments

Successful exists means that either the startup is acquired by a large firm or went to IPO.

Madison Stewart

EDUCATION

University of Pennsylvania, College of Arts and Sciences | Philadelphia, PA
BA in Economics | Expected May 2017
Cumulative GPA: 3.88/4.00

WORK EXPERIENCE

Goldman Sachs & Co | New York, NY
Summer Analyst, Corporate Derivatives | June - August 2016

- Worked in the Corporate Derivatives Product Group to design and implement hedging strategies
- Created derivative presentations for 10+ clients in a variety of industries including technology and retail
- Researched and constructed rate predictions and risk cone analyses, and priced $100mm-5bn derivative trades

SevaCall | Potomac, MD
Marketing Intern | June - August 2015

- Developed project experience at a startup
- Created a unique marketing model for future use by the company

LEADERSHIP EXPERIENCE

Consult for America, Upenn | Philadelphia, PA
Sales and Operations Consultant | 2014-2015

- Developed strategy for future crowdfunding campaign with $10,000 goal to relaunch client's product
- Researched point of sale systems to find an appropriate model for client based on pricing, inventory and report capabilities

Penn Move Out | Philadelphia, PA
Vice President of Marketing | 2014-2015

- Spearheaded advertisement campaigns including branding and social media implementation based on competitor research
- Developed and directed marketing strategies including loyalty program and enhanced price communication strategies

SKILLS

Microsoft Suite, Adobe Photoshop, Wordpress, Sketchup, iMovie

Experimental design

✓ One of the key outcomes is a founder's interest in contacting an investor after viewing their profile.

4. How likely would you be to contact Jonathan Rogers (e.g. send an email, build networks and relationships) for a meeting to discuss your startup financing, considering both his potential interest in your startup and your collaboration interest with him? (Remember that you have limited energy and the algorithm will generate top 10 recommended investors to you based on your preference.)

Will not contact   Contact for sure
0   10   20   30   40   50   60   70   80   90   100

Probability of contact

❖ Have the survey questions been tested in a pilot involving real founders and investors to make sure?

❖ What does it mean "collaboration interest"? – networking, fundraising, or working together to develop a founder's venture? Is this what founders and investors do in the real world?

Experimental design

✓ In the seminal work by Kessler et al. (2019) on "incentivized resume rating" (IRR), the participation incentive for recruiters is a packet of 10 resumes of real job seekers, and it was made known in the recruitment email.

[7] The recruitment email (see online Appendix Figure A.1) stated: "the tool uses a newly developed machine-learning algorithm to identify candidates who would be a particularly good fit for your job based on your evaluations." We

❖ As shown in the previous slide, the authors mention the incentives <u>in the middle of a five-question survey</u> (as well as in the recruitment email), will that distract/affect a participant's response?

❖ As an aside, how much is the take-up rate of survey participants afterward regarding your offer?

Experimental design

1. What's the probability that you feel Jonathan Rogers can help your company generate higher financial returns based on his quality? (Think only about your perception of his quality and attractiveness when gauging your interest level in the investor-- imagine that he is guaranteed to finance your startup.)

Not interested
0   10   20   30   40   50   60   70   Want to collaborate for sure   80   90   100

Probability of collaboration (Click on the bar)

2. What's the probability that you think Jonathan Rogers would show interest (e.g. offer a meeting or further discussion) in providing funding for your startup? (Think only about whether you feel he would finance you or not--when gauging how likely he would be to finance your startup, imagine that he has many startups to choose from.)

Will not show interest
0   10   20   30   40   50   60   70   Show interest for sure   80   90   100

Probability of showing interest

3. How much money are you comfortable asking for from Jonathan Rogers compared to your original funding plan, considering both his potential interest in your startup and your collaboration interest with him? (For example, if you feel it is safe to ask for 80% of your original planned funding needed from Jonathan Rogers, you can move the bar to 0.8.)

0   0.2   0.4   0.6   0.8   Benchmark 100% 50   1.2   1.4   1.6   1.8   >—2
0   100

percentage

4. How likely would you be to contact Jonathan Rogers (e.g. send an email, build networks and relationship for a meeting to discuss your startup financing, considering both his potential interest in your startup and y collaboration interest with him? (Remember that you have limited energy and the algorithm will generate recommended investors to you based on your preference.)

Will not contact
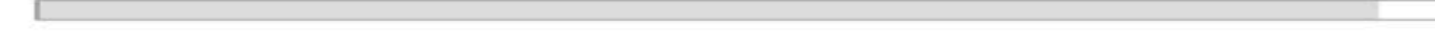0   10   20   30   40   50   60   70   Contact f   80   90

Probability of contact

5. Imagine that you have access to a professional online profile or resume of the investor. To what extent d think the profile is informative for evaluating Jonathan Rogers as a prospective collaborator?

Not informative at all
0   10   20   30   40   50   60   70   Provide all the infor   80   90

Informativeness

Back   Next

❖ The survey questions in the study are really long (20 in 20 minutes); Kessler et al. (2019) only have the following two really straightforward questions:

(i) "How interested would you be in hiring [**Name**]?"
    (1 = "Not interested"; 10 = "Very interested")

(ii) "How likely do you think [**Name**] would be to accept a job with your organization?"

Madison Stewart

EDUCATION

University of Pennsylvania, College of Arts and Sciences   Philadelphia, PA
BA in Economics   Expected May 2017
Cumulative GPA: 3.88/4.00

WORK EXPERIENCE

Goldman Sachs & Co   New York, NY
Summer Analyst, Corporate Derivatives   June - August 2016
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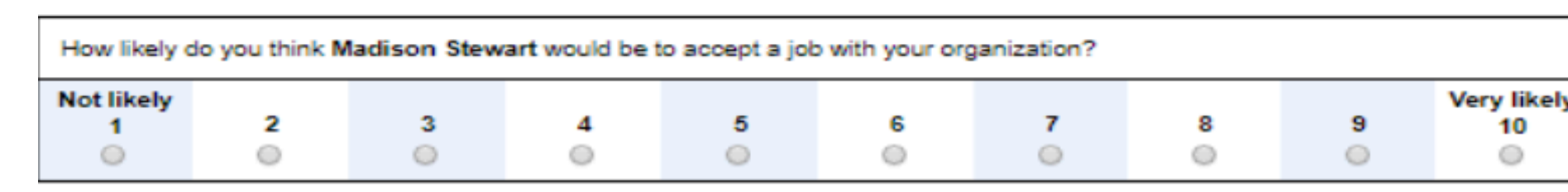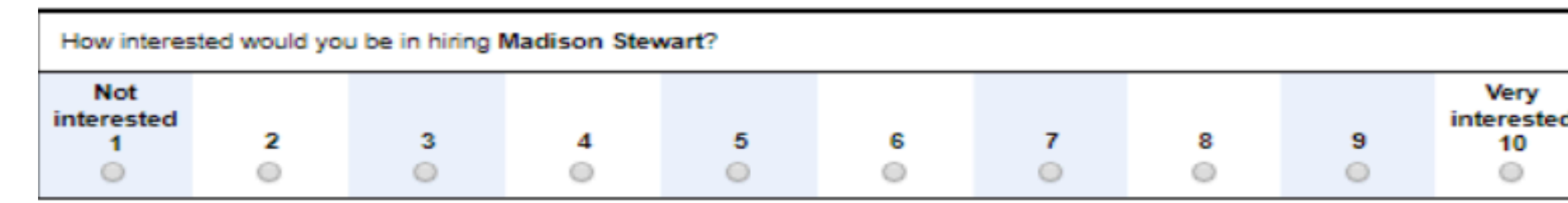Sales and Operations Consultant   2014-2015
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How interested would you be in hiring **Madison Stewart**?

Not interested 1	2	3	4	5	6	7	8	9	Very interested 10

How likely do you think **Madison Stewart** would be to accept a job with your organization?

Not likely 1	2	3	4	5	6	7	8	9	Very likely 10

Experimental design

✓ The authors simultaneously and independently randomize investor individual-level and angel/VC fund-level characteristics across the 20 investors that a participant will rate.

> Another alternative interpretation is the "balance the profile" hypothesis. To increase the experimental power, we intentionally skewed the gender distribution of investors to 40% female and 60% male, differing from the real-world distribution of approximately 20% female and 80% male. The higher proportion of female VCs in our randomization process may lead to two potential issues. Firstly, it could prime subjects to our experimental objectives,

❖ It would be informative to discuss how the distributions underlying the above randomization along eight dimensions are determined.

❖ What are the tradeoffs associated with the above choice regarding the female investor share? If the experiment has a skewed investor gender distribution, will founders' reactions in the experiment be the same as in the real world (with a much lower female investor share)?

Alternative interpretation(s)

✓ Profile is constructed based on the population of investors and VCs dominated by the majority (white males).

1. (Investor Name) was a successful entrepreneur himself earlier on in his career, cofounding 2 successful startups. Currently, he focuses on startup investment to promote more innovation in the world.

2. (Investor Name) was associated with a startup and served as the co-founder. Later he moved to a venture capital company, investing in early-stage startups and providing guidance.

3. (Investor Name) previously joined a consulting firm providing guidance and advice to startups. He later co-founded his own startup and became an early-stage investor.

4. When (Investor Name) was a student at college, she co-founded a startup during her undergraduate years. She later moved to a VC firm, helping startup founders develop their businesses.

5. Previously, (Investor Name) worked as a correspondent for a well known magazine and co-founded a successful startup later.

6. When (Investor Name) was at school, he was starting to ruminate on the idea of founding a company and co-founded a startup with his classmate after graduation.

7. Prior to joining the current position, (Investor Name) co-founded and sold a startup with utilizing his strategic, commercial and leadership skills.

8. An entrepreneur at heart, during his undergraduate years, (Investor Name) co-founded a startup and raised VC money. Later he decided to become an investor, helping more startups to grow.

Alternative interpretation(s)

❖ As a result, a typical profile contains <u>gendered language</u> that is incongruent with the gender role of women in society.

❖ This incongruency is more pronounced for "high quality" female investors (i.e., more successful female investors based on their profiles).

❖ This incongruency could contribute to participants' perception that the amount of information regarding a successful female investor is less credible, resulting in their negative responses in the experiment.

❖ My suggestion is to do a gender audit on the usage of words in the profile used.
  ❖ Nowadays, there are employment intelligence companies conduct auditing for job ads.
  ❖ Maybe there is also an opportunity to do a decomposition: the gendered role of (VC) investors versus the gendered language used in profiles

Gender homophily

✓ Gender homophily is captured by the interaction term Female Investor × Female Founder.

Table 3: Heterogeneous Effects Based on Founders' Gender and Race (Homophily)

Dependent Variable	Q1 Quality (1)	Q2 Availability (2)	Q5 Informativeness (3)	Q3 Funding (4)	Q4 Contact (5)
Female Investor	-4.39***	-4.08***	-6.52***	-0.59	-4.84***
	(0.96)	(0.82)	(1.03)	(0.69)	(1.05)
Female Investor × Female Founder	5.24**	3.63*	5.89**	1.70	5.97**
	(2.26)	(2.00)	(2.12)	(1.56)	(2.27)
Female Founder	-1.72	-43.04***	11.74***	-38.79***	-35.43***
	(1.44)	(1.28)	(1.33)	(0.99)	(1.44)
Asian Investor	-1.57*	-1.37*	0.11	-0.42	-0.86
	(0.94)	(0.71)	(0.71)	(0.61)	(0.86)
Asian Investor × Asian Founder	2.28	3.22*	1.13	1.91	3.29
	(2.47)	(1.93)	(1.33)	(1.21)	(2.11)
Asian Founder	-7.42***	29.82***	-21.85***	27.67***	26.64***
	(1.33)	(1.14)	(0.92)	(0.80)	(1.20)
Subject FE	Yes	Yes	Yes	Yes	Yes
Mean of Dependent Variables	59.09	54.95	67.36	48.71	60.15
Observations	2820	2820	2820	2820	2820
R-squared	0.388	0.547	0.660	0.674	0.444

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(Absence of) race homophily

- The last row of coefficients show that Asian founders favor non-Asian investors more. Asian founders assign higher contact interest ratings to non-Asian investors, even though they perceive non-Asian investors as of lower quality.

- How do we interpret this result? Does racial discrimination in the two-sided entrepreneurial financing market also exist, but in a different way than gender discrimination?

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Different sources of discrimination

❖ Bohren et al. (2023) argue that there are different sources of discrimination:

- **Taste-based discrimination:** "…an individual or firm has animus towards members of a particular group, and therefore may choose to discriminate against them because he receives disutility from providing services to or interacting with members of the group."

- **Accurate statistical discrimination:** "…discrimination may occur against members of a particular group because productivity is unobserved and the group *is correctly perceived to have a lower average productivity* due to exogenous differences."

- **Inaccurate statistical discrimination:** discrimination that stems from incorrect beliefs, i.e., an individual's beliefs about the productivity of different social groups may not be correct.

Linking findings from the experiment to the model

❖ In the model section of the paper, the authors argue that statistical discrimination can arise endogenously even though the two groups have identical quality distributions. This source of discrimination falls into the category of "inaccurate statistical discrimination."

- In other areas, such as female directors and female analysts, there is evidence that they possess stronger qualifications and perform better than their male counterparts.

- Is it okay to assume that taste-based discrimination does not contribute to gender discrimination in the two-sided entrepreneurial financing market?

Situating your paper with the prior literature

❑ Ewens (2022) collects facts from previous literature that there is a large gender and race gap in entrepreneurial participation. Then, the author summarizes several economic theories widely used in discrimination analysis.

❑ Chen and He (2023) use data on high-tech startups from accelerators to reveal that the probability of securing VC funding is similar for both genders, but funding amounts vary significantly.

❑ Herbert et al. (2024) look into the gender gap in the serial founding of VC-backed startups. Women are less likely to found another VC-backed startup following failure. Among those who do found another VC-backed firm, women raise significantly less capital.

❑ Alekseeva (2024) investigates the role of matching between venture capital (VC) investors and startups in explaining the differences in VC financing between female- and male-founded companies. The paper reveals that female-founded startups secure lower VC financing compared to male-founded companies, even when comparing similar founders and startups.

Conclusion

- A very ambitious and timely paper!

- Experimental design calls for some finetuning.

- Consider and address alternative interpretations.

- Good luck with the paper, and I look forward to reading the next version!