RESEARCH REPORT

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Do Female Investors Support Female Entrepreneurs? An Empirical Analysis of Angel Investor Behavior

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ABSTRACT

There is an ongoing debate on why female entrepreneurs face greater challenges than their male counterparts do in raising capital for their companies. Rooted in homophily – theory supporting the notion that women support women – is the argument that there are not enough female investors to support female-led firms. In the context of accredited investor-investee exchanges, we explored whether the gender of investor and the gender of investee's CEO are related. Using a United States sample of 529 investments from fiscal year 2018, we found a significant association between the gender of the investor and the gender of the investee's CEO. These findings suggest that homophily may be a key social mechanism through which gender can impede or promote investment decisions.

Keywords: gender, entrepreneur, funding

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INTRODUCTION

There is an enduring conversation about why women entrepreneurs are disadvantaged in raising capital for their firms (Kanze, Huang, Conley, & Higgins, 2018). For example, it can be argued that women seek and therefore receive less funding from investors (Coleman & Robb, 2009; Morris, Miyasaki, Watters, & Coombes, 2006). It can also be argued that investors are biased against women entrepreneurs (Brooks, Huang, Kearney, & Murray, 2014). Another perspective is that women receive similar amounts of funding as men when asking for lower amounts of funding, but significantly less when asking for higher amounts of funding (Geiger & Oranburg, 2018). Regardless of the perspectives, the discussion of gender influences in venture finance is still an evolving topic.

PERSPECTIVE FOR THIS STUDY

We continue research and dialogue on the association between gender and funding with a specific interest in fundraising through the lens of homophily. From this perspective, investors support entrepreneurs because of their tendency to associate with others based on shared characteristics (Greenberg & Mollick, 2017). Specifically, we follow up on an implication for future research from a study by Geiger and Oranburg (2018) that showed female entrepreneurs as less successful than men in raising large amounts of venture capital through investment crowdfunding. In that study, the researchers suggested two alternative and potentially contradictory theoretical implications to explain the empirical result that women *receive less when asking for more*. On one hand, women might not support women when funding decisions are an investment. That is, homophily effects (found in research on Kickstarter and other non-investment crowdfunding) may not generalize to the investment context. On the other hand, they posited that homophily may exist in investment contexts, but the lack of women investors limits these effects

for women entrepreneurs; therefore, a primary disadvantage of fundraising for women-led firms is a lack of women investors. We examined this further and asked the following research question.

Research Question: In the context of accredited investor-investee exchanges, is the gender of the investor related to the gender of the investee's CEO?

SAMPLE

Investments from angels, angel groups, and VCs are well documented, arm's length transactions where the gender of the lead investor and the gender of the CEO of the investee's firm is discrete and readily identifiable. As such, we were able to leverage a unique dataset provided to us by PitchBook (PitchBook Data Inc., 2019) that included a United States sample of investments from fiscal year 2018. Included in this dataset was the primary information of interest (i.e., the gender of the lead investor and the investee's CEO) and other firm and deal information. In all, we examined our research question on a sample of 529 investment decisions (N = 529) across 441 investors (9.3% women) and 269 companies (17.0% women CEOs).

ANALYSES AND RESULTS

To prepare data for analyses, we first examined variables for outliers and used natural log (ln) transformations for variables that were highly skewed. This resulted in ln-transformations for three variables: number of employees, valuation of the company, and deal size. Next, we explored how female investors compared to male investors with respect to the gender of the investee's CEO and other characteristics provided in our dataset (e.g., industry group, firm age, deal size, etc.). Because we compared a categorical variable (gender of investor) across other categorical variables (e.g., gender of CEO, industry group, etc.) and continuous variables (e.g., firm age, deal size, etc.), we used two different analyses to explore bivariate associations.

For categorical-categorical associations, we used chi-square tests, whereas for categorical-continuous associations, we used one-way ANOVA tests. Table 1 reports the results of these

analyses. With respect to the primary research question, the results showed that 40.8% of investments made by female investors were for companies that had a female CEO, whereas 14.6% of investments made by male investors were for companies that had a female CEO. As such, there was a significantly stronger association between female investors and female CEOs compared to male investors and female CEOs ($\chi^2 = 21.67$, p < .01).

Insert Table 1 about here.

There were several other differences of note. For example, there was a significant difference between female (18.4%) and male (3.5%) investors with respect to investments within the media/social media industry group ($\chi^2 = 20.91$, p < .01), and a marginal difference between female (42.9%) and male (57.1%) investors for investments within the software industry group ($\chi^2 = 3.65$, p < .10). Lastly, there was a significant difference in deal size, with female investors involved in deals (4.9M) that were significantly smaller than those of male investors (7.3M; *F*-statistic = 5.03, p < .05).

The results in Table 1 show that there was a significant difference between the key variables of interest (gender of investor and gender of investee's CEO). However, other factors may have played a role with respect to an investor's gender and their investment decision. As such, to examine our research question more thoroughly, we conducted binary logistic regression, which allowed us to examine the association of interest while controlling for other factors. To prepare the dataset for the regression analyses, we first performed multiple imputation by chained equations (MICE; *m* = 5) on the dataset to account for missing data (Buuren & Groothuis-Oudshoorn, 2010). This procedure provided more statistically valid results compared to other

missing data methods, such as listwise deletion and mean imputation (Fichman & Cummings, 2003; Graham, 2009).

The results of the logistic regression analyses are provided in Table 2. As displayed, Model 1 included all variables other than the CEO gender variable (*Nagelkerke R^2 = .10*). This model showed a positive association between women investors and the media/social media industry group (B = 2.96, p < .01). In Model 2, we entered the CEO gender variable (*Nagelkerke R^2 = .16*). This model showed that the association between women investors and the media/social media industry group remained significant (B = 2.86, p < .05). Moreover, the model showed a positive association between women investors and women CEOs (B = 1.37, p < .01). In all, the results provided support for the idea that female investors invest more in companies with female CEOs than male investors do, even after controlling for other factors.

Insert Table 2 about here.

DISCUSSION

In this research, we explored the association between the gender of investors and the gender of the investees' CEOs. Based on 529 investment decisions from fiscal year 2018, we found that female investors support female-led companies significantly more than male investors do. This association was significant even when controlling for other factors such as industry group, firm characteristics, and deal size.

Implications for Research

While there is a growing number of investors who are committed to funding female-owned firms, and a growing number of female investors, female-owned firms still are not getting funding at the same rate as male-owned firms. For a wider range of entrepreneurs to gain access to capital,

it is critical to understand the processes underlying investor behavior. For example, research has discussed how investors think with respect to gender and investments (Malmström, Voitkane, Johansson, & Wincent, 2018). Moreover, research has examined successes and failures of female-owned businesses in obtaining angel capital (Becker-Blease & Sohl, 2007). However, to our knowledge, this study is the first to determine how individual accredited investors actually behave with regard to the gender of the leadership of the target firm.

Understanding the relation between the gender of individual investors and the gender of investee's CEO can shed new light on investor behavior in entrepreneurial finance. While research has shown that homophily effects occur when financial choices appear to be a donation-based decision (Marom, Robb, & Sade, 2016), our results showed that the same effects may be present for investment decisions as well. Thus, if women entrepreneurs are underperforming men in investment contexts, research showing that women support women in investment contexts may provide potential solutions through an increase in accredited women investors.

Implications for Policy

If indeed an increase in women investors will help balance gender equity and equality in venture finance, then there may be important implications for policy. Law and policy are becoming increasingly focused on gender equity and equality. For example, the European Union's Organization for Economic Co-Operation and Development (OECD) report recognizes "women are much less likely to receive angel investment than men," but "policy can support the integration of women investors and advisers as part of angel networks, and support angel networks directed to investment in women's enterprises" (p. 21). As such, policymakers have begun to focus initiatives on women's entrepreneurship. However, despite the emerging consciousness and consensus that empowering women through entrepreneurship and similar economic opportunities

is a vital goal, there does not appear to be a consensus on what means would best achieve these ends.

Our research informs decision-makers who would seek to close the gender equity gap by highlighting the vital role that female investors might play in creating economic opportunity in women's entrepreneurship. According to our findings, women investors invest in women entrepreneurs at nearly triple the rate than male investors do. Moreover, these women investors are contributing millions of dollars in financing deals. Women investors are apparently willing and able to contribute the substantial financial resources necessary for women entrepreneurs to create high-growth ventures, and potentially develop world-changing technologies, in a way that grants and microloans cannot. Therefore, putting more effort into developing women investors who can contribute to high growth ventures may be one way that policymakers can promote high growth women-led ventures.

CONCLUSION

There is an emerging stream of literature on women and entrepreneurial finance. Results indicating potential interest in investing in women-led ventures and hypothetical decisions to invest in women-led ventures have provided key theoretical insights into why women may receive venture funding differently than men. We add to this stream of research by examining the extent to which women support women in an accredited investor context. We hope that our paper provides a platform for future studies on gender and venture funding.

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TABLE 1

Company, Deal, and Industry Characteristics by Investor Gender

Variable	Female (49)[a]	Male (480)[a]	*Sig. Test*
Categorical variables			Chi-square[b]
Company CEO			
1. Gender (female)	40.8%	14.6%	21.67**
2. Ivy league education	6.1%	14.6%	2.38 ^{ns}
3. Graduate degree	28.6%	32.9%	0.38 ^{ns}
Industry group			
4. Software	42.9%	57.1%	3.65†
5. Media/social media	18.4%	3.5%	20.91**
6. Retail/apparel	14.3%	11.9%	0.24 ^{ns}
7. Commercial/B2B	10.2%	8.1%	0.25 ^{ns}
8. Healthcare	12.2%	12.3%	0.00 ^{ns}
9. Other	2.0%	7.1%	1.83 ^{ns}
Continuous variables			F-statistic[c]
Company			
10. Firm age in years	3.77	4.27	2.09 ^{ns}
11. Ln Number of employees	2.70	2.92	0.68 ^{ns}
12. Ln Valuation of company ($)	16.66 (17.2M)	17.05 (25.4M)	2.13 ^{ns}
Deal			
13. Ln Deal size ($)	15.40 (4.9M)	15.81 (7.3M)	5.03*
14. Number of investors in deal	3.27	3.32	0.02 ^{ns}

N = 529 for bivariate associations unless otherwise noted. N = 519 for Ln Deal size ($). N = 494 for Firm age in years. N = 355 for Ln Number of employees. N = 266 For Ln Valuation of company.

[a] Number of investments by gender.

[b] Chi-square test for significant difference between female and male investments.

[c] *F*-statistic of one-way ANOVA test for significant difference between female and male investments.

^{ns} p > .10

† p < .10

* p < .05

** p < .01

TABLE 2
Binary Logistic Regression (Female Investor = 1; Male Investor = 0)

	Model 1		Model 2	
	B	SE	B	SE
Constant	-1.33	3.56	-3.02	3.51
Control variables				
Ivy league education	-0.48	0.65	-0.57	0.66
Graduate degree	0.14	0.37	0.17	0.38
Software	0.79	1.07	0.86	1.09
Media/social media	2.96**	1.14	2.86*	1.16
Retail/apparel	1.34	1.12	1.15	1.15
Commercial/B2B	1.35	1.14	1.47	1.17
Healthcare	1.21	1.14	0.95	1.16
Firm age in years	-0.14	0.09	-0.15	0.10
Ln Number of employees	-0.12	0.27	-0.15	0.28
Ln Valuation of company	0.22	0.36	0.29	0.34
Ln Deal size	-0.31	0.24	-0.28	0.25
Number of investors in deal	-0.01	0.07	-0.06	0.08
CEO gender variable				
Female			1.37**	0.35
-2 log likelihood	300.56		286.21	
Nagelkerke R^2	*.10*		*.16*	
ΔR^2 for step	-		*.06*	

N = 529. Multiple imputation by chained equations (MICE; m = 5) used for missing data.
[†] p < .10
* p < .05
** p < .01