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Equity Crowdfunding Success for Female Entrepreneurs: French Evidence

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Abstract

A large body of literature documents the significant difficulties experienced by female entrepreneurs in obtaining early-stage funding from investors. We investigate this issue in the emerging equity crowdfunding (ECF) context. Our results, based on data from four French ECF platforms, confirm that the feminisation of top management significantly reduces the likelihood of funding, suggesting that crowdfunding does not alleviate the difficulties that women face in raising funds to begin start-ups.

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1. Introduction

The entrepreneurial finance literature has shown considerable interest in the crowdfunding industry in recent years (Wallmeroth et al. 2018, Cumming and Johan 2017). Among different types of crowdfunding, equity crowdfunding (ECF) has emerged as a new financing source for entrepreneurs. As a specific form of crowdfunding, ECF allows any individual to invest in a start-up in exchange for some shares, whereas in other types of crowdfunding, remuneration takes the shape of products, services, gifts (pre-sales in the case of reward-based crowdfunding), or an interest payment (lending-based crowdfunding). From the investor's perspective, ECF is comparable to some extent to venture capital (VC) or business angel (BA) investing.

In the past decades, numerous start-ups have emerged thanks to both VC and BA; however, it has been reported that projects led by men still constitute the vast majority of investees (Marom *et al.* 2016, Vismara *et al.* 2017). A study published by *Fortune* magazine showed that only 2.2% of funds in the US VC industry had been allocated to women in 2017 (Zarya 2018). Becker-Blease and Sohl (2007) studied the deal flow for a panel of US BA investors and found a proportion of 8.9% of project proposals led by women. They found a similar acceptance rate for projects led by men and women. With regard to the funders themselves, Marom *et al.* (2016) have shown that the percentage of female backers on Kickstarter, the main reward-based crowdfunding platform, was higher than in venture capital (44% vs 6%); and Harrison and Mason (2007) have pointed to the low proportion of female business angels (5% in the UK and less than 10% in the US). It is therefore worth asking whether online equity investors on ECF platforms are positively disposed towards making ECF funds available to female entrepreneurs and, if so, to what extent.

Some research has shown interest in this topic in the context of crowdfunding; however, ECF has largely been neglected in the literature. Mollick (2013) found that on Kickstarter crowdfunded firms were more often led by women compared to venture capital-backed firms, but still less frequently than US firms as a whole. A study by PricewaterhouseCoopers (2017) based on an international dataset (also in the context of reward-based crowdfunding) showed that men were leading 89% of campaigns that reached at least $1 m, whereas initiatives led by women made up for only 28% of all campaigns.

By contrast, in the context of crowdlending Barasinska and Schäfer (2014) found neither a positive nor a negative effect suggesting bias for or against women seeking funds in Germany,

whereas in a similar US context Pope and Sydnor (2011) demonstrated that women were more likely to obtain funds. Lin and Pursiainen (2018) found that men tended to set higher goals on Kickstarter than women, but also experienced more failures in obtaining funds than women, suggesting that men tend to display greater over-confidence than women. However, men obtain more funds overall and women tend to focus on certain sectors in particular (Marom *et al.* 2016).

With regard to investors, Mohammadi and Shafi (2018) in Sweden and Hervé *et al.* (2019) in France have both documented a higher incidence of risk aversion among women, who tend only to invest in less risky ECF projects. Marom *et al.* (2016) and Greenberg and Mollick (2017) have highlighted that women largely finance projects led by women ('homophily'), whereas men do not.[1] The 'homophily' theory suggests that women actively support other women in order to alleviate discrimination. Groza *et al.* (2020) also show that, according to Spanish reward-based crowdfunding data, women tend to invest lower amounts but are more prone to back projects if they have social ties with those involved. It is important to investigate to what extent the crowd is either inclined or reluctant to finance projects led by female entrepreneurs. One might hypothesise that a crowd consisting of investors with more diverse backgrounds (in comparison with BA or VC investors) would be more inclined to finance projects led by women. At the same time, however, we may also conversely hypothesise that despite the 'democratic' aspect of crowdfunding, investors may prefer to invest in projects led by men, replicating behaviour observed in other investment activities.

Compared with reward-based crowdfunding, ECF implies a different relationship with the crowd: investors are shareholders of the start-up and therefore face issues related to shareholding (e.g., monitoring the firm, due diligence, etc.). ECF investing is mainly comparable to VC or BA activities, even though one could argue that the crowd is more passive, relying on the collective effort of others. To our knowledge, only three papers have investigated this issue in the ECF context. Vismara *et al.* (2017) confirmed the predominance of homophily, with men financing men projects led by men and women investing in initiatives led by women as well as a higher proportion of female investors compared to other financial resources that entrepreneurs may draw on. However, Vismara *et al*.'s study is limited, due to their focus on a small number of projects (58) over a short period (6 months) on a UK platform. Cumming *et al.* (2019), also using UK data (from Crowdcube, with 167 offers between 2013 and 2016), did not find a higher likelihood for women to attract investors. In contrast, Prokop and Wang

[1] This pattern has also been observed in the BA sector (Becker-Blease and Sohl 2007).

(2018) have shown on the basis of German data that women attracted fewer investors and funding than men.

Our paper offers several contributions to the research field. This study is the first to investigate the French ECF setting on a large dataset. France offers a unique context: it is considered as the crossroads of Europe and is the second largest crowdfunding market in Europe after the UK (Cambridge Centre for Alternative Finance, 2020). France is ranked third at the European level according to the Gender Equality Index,[2] following Sweden and Denmark, which have a strong Nordic culture in this field. In our analysis, we also consider top management composition and use data from four different platforms over an eight-year period. We believe this study to be the first to use a multiplatform dataset over a long period and with such a great diversity of gender proxies.

The remainder of the paper is organised as follows. The following section describes the database that we used and our methodology. The empirical results are presented in Section 3, followed by some concluding remarks.

2. Data and methodology

In order to answer our research question, we focused on the French ECF market. We built a unique data set derived from the four largest ECF platforms in France in terms of number of deals and cash invested: Wiseed, Smart Angels, Sowefund, and Anaxago. Using multiple platforms reduces the risk of selection bias (Dushnitsky and Fitza 2018) and increases the generalisability of our results.

We collected campaign data about all the companies that had raised funds between 2010 and 2017. We did not include information pertaining to follow-on financing to avoid potential new bias in the data set. Our sample is well diversified in terms of sectors (from biotech to traditional services and agriculture) and funding goals (from €100,000 to €8,000,000, with an average value of €490,444 and a median goal equal to €350,000), in line with practices on the French market (Financement Participatif France and KPMG, 2019). Overall, our data set comprises 184 projects, which aggregates the majority of the French market for ECF investment into entrepreneurial projects.[3]

[2] https://eige.europa.eu/gender-equality-index/2019/compare-countries

[3] During this period, it accounted for about 40.17% of the French ECF market, adding up to €85m, while the total ECF market (including follow-on financing and real-estate investment) totalled €211.9m (data from Financement Participatif France).

To construct our gender variables, we manually checked the entrepreneurs' and top managers' identities on crowdfunding campaign webpages, funded companies' websites, and LinkedIn profiles.

Our dependent variable is the funding percentage of the equity crowdfunding campaign (i.e., the completion percentage of the funding goal). It is equal to the total amount received during the campaign divided by the threshold amount at which the firm starts receiving the money (i.e., the campaign goal). This variable is preferred to a success dummy since when the amount pledged is below the goal, fundraising is not called off and the entrepreneur will be able to keep the money invested; such platforms use a keep-it-all funding model (Cumming *et al.*, 2020). Funding ratios in our sample range from 0% to 944%, with a median value of 100% and an average of 107%.

Table 1. Statistics & Distribution

Our final sample consists of 184 equity crowdfunding campaigns on four French crowdfunding platforms for the period 2010–2017.

Panel A. Summary Statistics

Variable	N	Mean	St.Dev.	Min.	Median	Max.
Female CEO	184	0,0973	0,297	0	0	1
Completion Ratio	184	1,07	0,893	0	1	9,44
Firm Age	184	3,44	3,26	-1	3	29
Goal	184	490444	655901	100000	350000	8000000
CEO holds a PhD	184	0,13	0,338	0	0	1
CEO has experience in High-Tech	184	0,391	0,491	0	0	1
CEO is Caucasian	184	0,946	0,227	0	1	1
Paris/I.D.F. Dummy	184	0,4	0,491	0	0	1
Campaign Date	184	2015	1,33	2010	2015	2017

Panel B. CEO geographic distribution (in %)

	Province	Paris/IDF	Total
Male CEO	62.28	37.72	100.00
Female CEO	38.89	61.11	100.00
Total	60.00	40.00	100.00

Panel C. CEO distribution across platforms (in %)

	Platform				
	Anaxago	SmartAngel	Sowefund	Wiseed	Total
Male CEO	26.35	28.14	12.57	32.93	100.00
Female CEO	27.78	22.22	22.22	27.78	100.00
Total	26.49	27.57	13.51	32.43	100.00

Panel D. CEO distribution across years (in %)

	Campaign Date							
	2010	2012	2013	2014	2015	2016	2017	Total
Male CEO	2.40	1.20	7.19	16.77	33.53	29.94	8.98	100.00
Female CEO	0.00	0.00	5.56	16.67	33.33	33.33	11.11	100.00
Total	2.16	1.08	7.03	16.76	33.51	30.27	9.19	100.00

As for our main independent variable, we use a dummy variable equal to 1 if the CEO position is held by a woman and 0 if it is held by a man. Women led 9.73% of campaigns in our sample.

We also investigated the ratio of woman and the presence of woman in higher tier management (Top Three). The first alternative variable “Female Ratio in top3” takes the discrete values of 0, 1/3, 2/3 or 1. A value equal to 0 means that the Top Three is entirely composed of men; conversely, a value equal to 1 means that it is entirely made up of women. The second alternative variable “At Least 1 Female in Top3” is a dummy equal to 1 if there is at least 1 female in the top management team and 0 otherwise.

In panels B, C and D of Table 1, we present the distribution of CEO gender across geography, platform and campaign date. We further test the biases that such differences might introduce (see results section, Table 4).

We also include control variables based on certain personal characteristics of the CEO (PhD level, Hi-Tech Experience and Ethnicity), the geographical location of the firm and crowdfunding campaign goal, date and platform. We define them in Appendix 1.

3. Results

Investors' funding decisions on ECF platforms are biased: all other things being equal, companies with at least one woman in the top management are less likely to be funded. This result has four implications.

First, our descriptive statistics reveal that only 9.73% of campaigns were led by a woman. This proportion is quite low compared to French national statistics about entrepreneurship in general — 39% of newly founded companies are led by women (INSEE 2019) — and accords with results obtained by Mollick (2013) in the US in the context of reward crowdfunding. Start-ups financed by VC firms in France are also less likely to be led by women: in 2018, female founders only obtained €239 m (or 7.4%) out of a €3.62 bn market in value (StartHer/KPMG 2019). In absolute numbers, only 77 female-led start-ups were funded out of a total of 614 (12.5% of the deals). However, our data did not enable us to detect whether platforms were biased against women, because we did not possess any statistics or characteristics concerning the deal flow of projects submitted to these platforms.

Second, as shown in Table 2, our analysis indicates that start-ups led by women raise about 19% less money than their equivalents led by men. Models 3 and 4 in Table 2 show no negative impact of the presence of women in top management, except where a woman occupies the position of CEO, i.e., as long as the CEO is a man. We control that effect for many additional characteristics both for the leader and for the campaign itself.

Table 2. OLS Regressions

This table shows the impact of the team leader's and members' genders on the success of the equity crowdfunding campaign (funding ratio) using OLS regression models. Models 1 and 2 use a dummy equal to 1 if the CEO is a woman (and 0 otherwise) as the main dependent variable. The following models show results for the proportion (Model 3) and presence (Model 4) of women in firms' top management team. Standard errors are clustered at France's department level (a French 'department' is an administrative area). Significance levels are based on two-tailed tests (p-value): * p < 0.1, ** p < 0.05, and *** p < 0.01.

	(1)	(2)	(3)	(4)
Female CEO	-0.233**	-0.189**		
	(0.099)	(0.091)		
Female Ratio in Top3			0.232	
			(0.150)	
At Least 1 Female in Top3				0.112
				(0.103)
LnGoal		-0.341***	-0.345***	-0.341***
		(0.036)	(0.039)	(0.034)
Firm Age	0.008	0.007	0.006	0.006
	(0.028)	(0.023)	(0.024)	(0.023)
CEO holds a PhD	-0.208	-0.189	-0.184	-0.179
	(0.149)	(0.139)	(0.127)	(0.128)
CEO has experience in High-Tech	0.148	0.137	0.135	0.133
	(0.140)	(0.133)	(0.132)	(0.130)
CEO is Caucasian	0.029	0.018	0.104	0.091
	(0.300)	(0.291)	(0.296)	(0.302)
Paris/IDF F.E.	yes	yes	yes	yes
Date F.E.	yes	yes	yes	yes
Platform F.E.	yes	yes	yes	yes
Constant	0.933***	5.109***	5.094***	5.048***
	(0.182)	(0.438)	(0.434)	(0.404)
No. of Obs.	184	184	184	184
R2	0.234	0.275	0.276	0.275

We then performed additional robustness checks. In Table 3, we shows the results of applying iteratively reweighted least square regressions as described in Li's paper (1985). By doing that, we are able to control the effect of outliers, which is quite important in our sample due to the large range of goals and the relatively small number of observations (which is usual in ECF).

Results are similar and the negative effect of female leadership on a campaign is even reinforced.

Table 3. Iteratively Reweighted Least Square Regressions

This table shows the impact of the team leader's and members' genders on the success of the equity crowdfunding campaign (funding ratio) using iteratively reweighted least square regression models, following Li's recommendations (1985). Estimates were computed via iteratively reweighted least squares based on Cock's distance, making this methodology robust to outliers. We used the default model specifications and tuning. Models 1 and 2 use a dummy equal to 1 if the CEO is a woman (and 0 otherwise) as the main dependent variable. The following models show results for the proportion (Model 3) and presence (Model 4) of women in the firm's top management team. Significance levels are based on two-tailed tests (p-value): * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

	(1)	(2)	(3)	(4)
Female CEO	-0.293***	-0.259***		
	(0.099)	(0.095)		
Female Ratio in Top3			-0.211*	
			(0.109)	
At Least 1 Female in Top3				-0.086
				(0.062)
LnGoal		-0.130**	-0.149***	-0.155***
		(0.051)	(0.051)	(0.051)
Firm Age	-0.001	0.001	0.002	0.001
	(0.009)	(0.009)	(0.009)	(0.009)
CEO holds a PhD	0.103	0.098	0.089	0.093
	(0.096)	(0.092)	(0.092)	(0.092)
CEO has experience in Hi-Tech	-0.037	-0.043	-0.045	-0.048
	(0.065)	(0.062)	(0.062)	(0.062)
CEO is Caucasian	0.107	0.064	-0.004	0.004
	(0.134)	(0.128)	(0.128)	(0.127)
Paris/IDF F.E.	yes	yes	yes	yes
Date F.E.	yes	yes	yes	yes
Platform F.E.	yes	yes	yes	yes
Constant	0.741***	2.364***	2.698***	2.773***
	(0.249)	(0.667)	(0.667)	(0.669)
No. of Obs.	184	184	184	184
R2	0.342	0.393	0.391	0.389

Two remaining issues led us to perform propensity score matching comparing ECF campaigns led by men to those led by women, as presented in Table 4. First, to solve issues linked to the small proportion of female led campaigns and their distribution across time, geographical location and ECF platforms, we performed PSM on three variables: Paris/IDF dummy, year and ECF platform. Results confirm that initiatives led by women receive less financing than their male counterparts by approximately 27% (Table 4, Models 1 and 2). Second, to control for self-selection issues raised by the lower-than-expected ratio of campaigns led by women, we introduced PSM on the personal characteristics of CEOs, namely level of academic qualification (PhD), previous experience in high-tech industry and ethnicity. Here also, results show a significantly negative effect of a female CEO on fundraising (Table 4, Models 3 and 4).

Table 4. Propensity Score Matching

This table shows the impact of the team leader's and members' genders on the success of the equity crowdfunding campaign (funding ratio) using OLS regression models after propensity score matching. Models 1 and 2 are performed after PSM on geography, crowdfunding platform and campaign date to control for issues on distribution of the small number of observations. Models 3 and 4 are performed after PSM on the personal characteristics of the CEO (PhD, Experience in High-Tech and Ethnicity) to control for self-selection bias. Significance levels are based on two-tailed tests (p-value): * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

	(1)	(2)	(3)	(4)
Female CEO	-0.351***	-0.270***	-0.509***	-0.164**
	(0.079)	(0.052)	(0.072)	(0.081)
LnGoal		-0.278*		-0.310**
		(0.157)		(0.155)
Firm Age		-0.006		0.003
		(0.026)		(0.021)
CEO holds a PhD		-0.126		-0.287
		(0.158)		(0.194)
CEO has experience in Hi-Tech		0.170		0.100
		(0.166)		(0.156)
CEO is Caucasian		-0.040		0.693***
		(0.133)		(0.195)
Paris/IDF F.E.	no	yes	no	yes
Date F.E.	no	yes	no	yes
Platform F.E.	no	yes	no	yes
Constant	1.114***	4.511**	1.104***	4.162**
	(0.073)	(2.119)	(0.071)	(1.945)
No. of Obs.	322	321	332	332
R2	0.058	0.324	0.132	0.373

Our results concerning the effect of gender on the ability to obtain funding for entrepreneurial projects are in line with those relating to BA and VC financing (Becker-Blease and Sohl 2007, Zarya 2018). However, they do not converge with recent research studies and consulting reports using reward-based crowdfunding data. Indeed, according to PricewaterhouseCoopers (2017), female entrepreneurs are more successful than male entrepreneurs on crowdfunding platforms, with a success rate of 24% for women and 13% for men. This difference in favour of women also applies in the high-technology industry (Greenberg and Mollick 2017), with 13% for women and 10% for men.

Our findings do converge with previous studies on ECF in other countries (Vismara *et al.* 2017, Prokop and Wang 2018) and, to some extent, with those of Cumming *et al.* (2019).

Our study brings a fresh perspective to the research literature on this subject, as we used data specifically referring to France, a country that has a high ranking in the gender equality index. The mixed results obtained in the crowdfunding context confirm differences, in terms of online investor patterns of behaviour, between the consumer perspective (reward-based crowdfunding) and investor perspective (equity-based crowdfunding).

4. Summary and concluding remarks

This paper contributes to our understanding of the success factors involved in ECF campaigns. More specifically, it supports and extends the emerging literature on the impact of gender on fundraising success. The results, based on three units of measurement in the French context and on a dataset covering multiple platforms, are consistent with those of most other research papers. They confirm a pro-male bias amongst online investors in equity crowdfunding. Therefore 'Female CEO' negatively impacts our 'Funding ratio' variable, i.e., the capacity to reach or outperform the campaign's financial objectives.

These results are exploratory and raise numerous complementary questions. First, further research could investigate the deal flow of ECF platforms, in particular to disentangle possible causes: to what extent, for example, do female entrepreneurs submit fewer projects online than male entrepreneurs? Does this correspond to a self-selection effect of women anticipating a lower funding probability? In addition, do platforms tend to discriminate against women by rejecting more projects led by women than campaigns led by men?

Second, it would be interesting to understand why we observed a significantly lower crowd propensity to finance start-ups led by women. Current literature is developing theories based on homophily (Greenberg and Mollick 2017). In contrast, other studies suggest a higher

performance level for listed firms led by women as well as less risk-taking (Khan and Vieito 2013, Jalbert *et al.* 2013).

Third, we could replicate and scale up our research in other cultural contexts. Indeed, the gender bias of investors is strongly linked to social, historical and cultural norms; comparing practices could therefore generate a better understanding of some national specificities (Ke 2018). More recently, specialised platforms designed to finance female entrepreneurs have emerged (e.g., iFundWomen in the USA and MyAnnona in France), and these may also constitute an interesting avenue for future research.

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Appendix 1

Variable	Description
Female CEO	Dummy variable equal to 1 if the CF campaign leader is a woman
Completion Ratio	Ratio between amount collected and campaign goal
Firm Age	Age of the firm at CF campaign date
Goal	Amount required to complete the CF campaign
CEO holds a PhD	Dummy variable equal to 1 if the CF campaign leader holds a PhD
CEO has experience in Hi-Tech	Dummy variable equal to 1 if the CF campaign leader has experience in the Hi-Tech industry for at least XX years
CEO is Caucasian	Dummy variable equal to 1 if the CF leader is Caucasian
Paris/I.D.F. Dummy	Dummy equal to 1 if the firm headquarters is located in the region “Ile de France” (including Paris)
Campaign Date	Year of beginning of the CF campaign