The Role of Expertise and Risk Diversification Strategies in Equity Crowdfunding

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Abstract. This study had the objective to determine the characteristics of investors willing to fund start-ups through crowdfunding platforms. In contrast to what prior empirical research suggests, including in personal investment literacy literature and economic literature of household portfolios, demographic factors such as gender, age, or formal education level were not highlighted as statistically significant in the empirical analysis explaining the investor's expertise in equity crowdfunding. Conversely, household income and working status were critical determinants of this equity crowdfunding strategy. We state that learned skills and solid financial wealth matter more than demographics explaining investors' expertise in picking stocks in equity crowdfunding. We examine the determinants of the risk diversification strategy in equity crowdfunding and found that formal education, working status, and assessed investor profile had statistical significance in explaining the relationship. According to the results, we expect that individuals with a higher level of formal education, higher working status, but with lesser investment experience would diversify more and spread risk when allocating money in early-stage start-ups through equity crowdfunding projects. However, either age or the Investor's wealth and income level would not be good predictors of risk diversification strategy.

Introduction

Franklin, James, and Philip (2002, p. 5) defined e-finance as "the provision of financial services and markets using electronic communications and computation." It is not a new concept since, e.g., the electronic communication system through Fedwire began in 1918, and the NASDAQ market, involving the electronic trading of stocks, started in 1971. The only difference with what is happening today is the widespread use of information and communication technologies owing to the cheap accessibility provided to its users, whether individuals or organizations. This development leads the e-finance concept to a new and creative source of funding that has become increasingly available for entrepreneurs looking to finance their ventures: equity crowdfunding. As a concept, the crowdfunding phenomenon is relatively new but has developed and spread significantly in the past years. For instance, this is evident because the United States government passed in 2012 the JOBS Act (Stemler, 2013) to regulate this entirely new market for fundraising.

The Internet has created much easier access to traditional financial services such as mortgage processing, credit card payments, or checking and saving accounts. It has also boosted online investing opportunities like the ones

offered by the equity crowdfunding platforms. Online investing has significantly impacted the investor's decision-making process by providing instant access to a large amount of financial information, lower transaction costs, and quick order execution (Volpe, Kotel, and Chen, 2002). Even though the Internet's benefits in online investing, there are also some disadvantages, including the increase in corporate fraud and accounting misinformation cases (Neisius and Clayton, 2014). Researchers suggest that only informed decisions based on a solid understanding of investment concepts and tools will offer investors a better chance of success (Volpe et al., 2002).

Many researchers have investigated the crowdfunding phenomenon since Howe's pioneer work in 2006, providing new insights into this research field and elaborating different theories and practices (Gierczank, Bretschneider, Hass, Blohm, and Leimeister, 2015). Equity crowdfunding is possible because entrepreneurs can collect the needed investment from a large group of investors, each of them providing a small contribution. Parallel to this entrepreneur-investor process, the crowdfunding scheme can become real just because the crowdfunding platforms act as intermediaries between entrepreneurs or companies and potential investors. Accordingly, Belleflamme, Lambert, and Schwienbacher (2014) divided the crowdfunding stakeholders into three groups: entrepreneurs seeking funding for their projects, investors willing to invest in a specific project, and the matchmaking crowdfunding platforms acting as intermediaries between entrepreneurs and investors.

Entrepreneurs are usually private persons (Gerber, Hui, and Kuo, 2012; Verstein, 2011) and organizations (Belleflamme et al., 2014; Bradford, 2012; Schwienbacher and Larralde, 2010). The JOBS Act's adoption in the United States and the regulation at the European and intra-European national-level set out the guidelines for private individual investors and the organizational type (Hooghiemstra and de Buysere, 2015; Mollick, 2014), including business angels or venture capitals.

Recently, many "*new*" equity crowdfunding platforms allow entrepreneurs to raise money from whom Gierczank et al. (2015) called "*an undefined group of online users*." We surveyed equity crowdfunding investors to determine whether we can extract some common characteristics to define this "undefined group of online users." We develop a set of hypotheses predicting the characteristics of equity crowdfunding investors. Later we classified these

hypotheses according to the equity crowdfunding investor experience or risk diversification by drawing, respectively, upon the frameworks of personal investment literacy (Chen and Volpe, 1998; Volpe, Chen, and Pavlicko, 1996; Volpe et al., 2002) and household portfolios (Guiso, Haliassos, and Japelli, 2002).

The paper is structured as follows. We first introduce the two literature bodies to which this study contributes: personal investment literacy and household portfolio. We then layout our hypotheses. Later, the method section and empirical analyses follow. Finally, we discuss our findings and conclusions.

1. Literature review

Literature has widely studied the main profiles of "professional" investors investing in financial decisions, either considering business angels or venture capital. Previous research has shown that angel investors are the most successful entrepreneurs providing valuable assistance to young firms in their community (Morrissette, 2007). It is also well known that venture capital firms are typically organized as independent private partnerships, run by a relatively small number of general partners. While some of these partners previously worked in financial institutions, many have prior business experience (Bottazzi, Da Rin, and Hellmann, 2008). Business angels and venture capital's investors are involved in investment processes for both financial return and the challenge to support new venture processes (Metrick and Yasuda, 2016).

Investors' characteristics have been researched extensively in different countries, including the United States (Aram, 1989; Freear, Sohl, and Wetzel, 1994; Sørensen, 2007), the United Kingdom (van Osnabrugge, 2000), Sweden (Avdeitchikova, 2008), Canada (Black and Gilson, 1998; Cumming and MacIntosh, 2006; Duxbury, Haines, and Riding, 1996), Finland (Lumme, Mason, and Suomi, 1996), Japan (Tashiro, 1999), Australia (Hindle and Wenban, 1999), Norway (Reitan and Sørheim, 2000) and Singapore (Hindle and Lee, 2002). These studies have also frequently profiled a typical angel and venture capital investor as a high-worth middle-aged male with entrepreneurial experience.

When considering "non-professional" investors, however, two different and complementary approaches may be of interest. On the one hand, the personal investment literacy framework (Volpe et al., 1996), focusing on individuals

facing important decisions that will impact their present and future economic wealth. Such decisions include accumulating funds for a down payment for a house or an automobile, a child's education, personal goals and dreams, and retirement. Research conducted in the past 40 years indicates that such investors have inadequate knowledge about personal finance because they do not have a personal finance education, knowledge, or experience (Remund, 2010). Some authors suggest that providing people with the training to improve their knowledge in personal finance is an urgent issue in some areas of society, and getting the expertise can help reduce the cases of fraud and accounting misinformation in online investing (Chen and Volpe, 1998), particularly in a new phenomenon as equity crowdfunding. The personal financial literacy framework should provide a reasonable basis for explaining the determinants of the investor's experience in equity crowdfunding.

On the other hand, the household portfolios framework (Guiso, Haliassos, and Japelli, 2002) attempts to explain the determinants of risky assets' demand by the household portfolios investors (Maula et al., 2005). It is pertinent to our research because an investment in a new startup can be considered a risky asset (Maula, Autio, and Arenius, 2005). The majority of investments in equity crowdfunding occur in new startups, according to R. Harrison (2013), Kuppuswamy and Bayus (2013), Ahlers, Cumming, Günther, and Schweizer (2015), Belleflamme et al. (2014) or Mollick (2014). Some of the predictors from the household portfolio framework that were validated by empirical research are age, financial wealth and income, education, attitude towards risk, experience in previous investment, stock market participation, and allocation among different type of assets (Guiso, Haliassos, and Japelli, 2003, 2002; Perraudin and Sørensen, 2000; Poterba and Samwick, 2003). Therefore, the household portfolio framework should provide a sound basis for explaining risk diversification determinants in equity crowdfunding.

According to at least one of the frameworks mentioned earlier, the following subsections discuss some characteristics that have been previously studied and considered relevant of private equity crowdfunding investors. Alongside, we shall state our main hypotheses.

1.1. Types of Investor

Prior research suggested considerable differences among different types of investors, particularly in the business angel and venture capital ecosystems.

Differences could arise regarding the use of qualifications and experience or information, channels, and networks (Sørheim and Landström, 2000). According to Landström (1992), certain groups of investors can identify investment proposals because they have lower search costs than other groups that lack the experience or network to identify these opportunities. Even though investors identify an investment proposal, they still have to assess it and deal with both market and agency risk (Fiet, 1991). Investors can use previous experience in other companies or industries to reduce the market risk (Sørheim and Landström, 2000). In order to handle the agency risk, the literature review suggests that investors should: (a) make fewer investments, and (b) increase the entry barriers to other potential investors (Landström, 1992).

In the equity crowdfunding scheme, access to investment proposals is open to any investor registered on the crowdfunding platform. Such investors could be associated with a business angel or a venture capital fund and small and private investors. Cholakova and Clarysse (2015), Gierczank et al. (2015), Ordanini, Miceli, Pizzetti, and Parasuraman (2011) have lightly reviewed some research on equity crowdfunding investor categorization.

The literature on equity crowdfunding suggests some differences in the investors' strategies in the equity crowdfunding ecosystem compared to business angels and venture capitalists' strategies. According to Ahlers et al. (2015) and Malmendier and Shanthikumar (2007), entrepreneurs usually signal small investors, i.e., those that: (a) invest relatively small amounts of money, and (b) receive a relatively small stake of a company in return. These small investors are likely to lack the financial sophistication and experience of venture capitalists, who are usually knowledgeable about valuing startups and assessing founding teams (Freear et al., 1994). Furthermore, the costs for angel investors and venture capitalists of evaluating ideas and teams are reasonably small, but they would be prohibitively high for small investors who lack sophistication, knowledge, and experience (Ahlers et al., 2015). Therefore, we predicted:

> **Hypothesis 1:** Equity crowdfunding investors exhibit different investment strategies, classified using a limited number of dimensions reflecting their prior expertise and risk diversification level.

1.2.Gender

Prior research examining investors' characteristics has found that business angel and venture capital is a male-dominated activity (Maula et al., 2005). In the United Kingdom, Harrison and Mason (1992) found that 99 % of these investors were men. This figure is very similar to the one reported in Australia (Hindle and Wenban, 1999). In other countries, the share of men among business angel and venture capital investors is as high as 97% in Norway (Reitan and Sørheim, 2000) and Japan (Tashiro, 1999) and 90% in Singapore (Hindle and Lee, 2002). However, when focusing on more broadly defined investors, the shares of women investors have been found to reach 30.1% in 29 nations of Global Entrepreneurship Monitor countries, 34.1% in the United States, 32.2% in the United Kingdom, and 24.1% in Germany (Maula et al., 2005). Nonetheless, female investors are still significantly under-represented compared to women's prevalence in the base population (Bygrave, Hay, Ng, and Reynolds, 2003). Previous research in reward-based and equity crowdfunding has found that 26% of the investors were female (Cholakova and Clarysse, 2015).

Goffee and Scase (1983) and R. T. Harrison and Mason (2007) identified three differences between men and women that can affect their investment performance and decision making: (a) women usually have lower stock of both human and financial capital, as a result of occupational segregation in the labor market, (b) women have lower levels of meaningful business experience because women mainly socialize into the caring/nurturing role and not in the business environment, and (c) women have different intentions when investing in a business, in response to the labor market or domestic subordination, for work-family balance or as a feminist tendency. Because of these differences, men have more opportunities to accumulate additional business knowledge and experience than women. In that sense, male investors would have fewer difficulties managing their finances than most women (Volpe et al., 2002) and perform better on expected returns than female investors (Bosma, Van Praag, Thurik, and De Wit, 2004). Barber and Terrance (2001) supported this last statement, and they found a lesser proportion of women reporting to have excellent or extensive investment experience, compared to men reporting the same level of experience. Furthermore, some researchers investigating the allocation of portfolio assets have found that gender is significantly related to asset allocation (Finucane, Slovic, Mertz, Flynn, and Satterfield, 2000; Jianakoplos and Bernasek, 1998; Sundén and Surette, 1998); and that women's portfolios are less riskier than men's (Charness and Gneezy, 2012). Therefore, we predicted:

Hypothesis 2:
H2.a. There is a positive relationship between gender and equity crowdfunding experience, with more male investors using their prior investment expertise.
H2.b. There is a negative relationship between gender and risk diversification strategies in equity crowdfunding, with fewer male investors prioritizing risk diversification strategies.

1.3. Age

According to personal investment literacy, older investors are more knowledgeable about investing than younger investors (Chen and Volpe, 1998; Volpe et al., 1996, 2002). Furthermore, the household portfolios framework suggests that very young and very old individuals should have less tendency to invest in startup companies and contribute to such companies' success (Guiso, Haliassos, and Japelli, 2002; Maula et al., 2005). This expectation is corroborated by findings reported in research on household portfolios, where a curvilinear (inverted-U-shaped) relationship has been predicted and empirically demonstrated between age and ownership of risky assets (Guiso et al., 2003; Guiso, Haliassos, and Jappelli, 2002). In line with these predictions, prior research on business angels has found that a typical business angel investor is middle-aged (Freear et al., 1994). The average age of business angels or venture capital investors were in the range from 40 (median) in Australia (Hindle and Wenban, 1999), 42 or 47 in the United States (Freear et al., 1994), 47 in Norway (Reitan and Sørheim, 2000), 53 in the United Kingdom (Harrison and Mason, 1992), 54 in Sweden (Landström, 1993) to 60 in Japan (Tashiro, 1999). In Finland, Lumme et al. (1996) found that 67% of the investors were between 40 and 60. Therefore, we state that:

Hypothesis 3:
H3.a. There is a positive relationship between the investor's age and the investor's equity crowdfunding experience.
H3.b. There is a curvilinear (inverted-U shaped) relationship between the investor's age and his/her e risk diversification strategy in equity crowdfunding.

1.4. Education

The personal investment literacy framework states that more education participants usually have better knowledge or experience in investing than

those with less education (Volpe et al., 2002). A household portfolio literature review predicts a positive association between the level of education and investment in risky assets such as stocks (Guiso et al., 2003). Prior descriptive studies on business angels and venture capital investors' characteristics align with these frameworks (Maula et al., 2005). Freear et al. (1994) and Mason and Harrison (2000) state that a typical investor is well educated. Other studies have found that in the United States, 82% had at least undergraduate degree (Aram, 1989), in Canada, 30% had a university degree, and 39% had a post-graduate degree (Cumming and MacIntosh, 2006), in the United Kingdom 74% had a university degree (Maula et al., 2005). In Finland, 56% had a master's degree, and 8% had a doctoral degree (Lumme et al., 1996). Therefore, we similarly expect:

Hypothesis 4:
H4.a. There is a positive relationship between the investor's education level and his/her investor's equity crowdfunding experience.
H4.b. There is a negative relationship between the investor's education level and his/her risk diversification strategy in equity crowdfunding.

1.5. Household income

According to the personal investment literacy research, participants with higher annual income showed more knowledge than those with a lower income (Volpe et al., 2002). In the same line, according to the household portfolio literature, some of the most critical determinants of investments in risky assets are financial wealth and income (Gollier, 2002; Guiso et al., 2003; Guiso, Haliassos, and Japelli, 2002). A high level of income allows the investor to spread his/her assets more widely across more companies, and therefore, also include vehicle investments such as equity crowdfunding in her portfolio. A smaller income levels, the downside risk associated with risky investments becomes prohibitive (Maula et al., 2005), thus reducing the investment vehicles and likely exclude equity crowdfunding. In line with these arguments, prior research on similar investments' characteristics has found that a business angel or venture capital investor typically has a high net worth and income level (Freear et al., 1994; Harrison and Mason, 1992; Mason and Harrison, 2000). Therefore, we predicted:

Hypothesis 5:
H5.a. There should be a positive relationship between the investor's wealth and income and its equity crowdfunding experience.

H5.b. There should be a negative relationship between the investor's income level and its risk diversification strategy in equity crowdfunding.

1.6. Working status

Employees at higher levels of working status tend to have better knowledge and expertise in investment decision-making (Volpe et al., 2002). Many organizations train their top executives to improve their productivity (Garman, Leech, and Grable, 1996) and knowledge. The literature on household portfolios argues that a secured income is associated with the propensity to make risky but more diversified investments (Gollier, 2002). Not only does a steady income coming from a higher working status contribute to the household's available wealth, but it is also associated with a diversified portfolio. Furthermore, a steady income source is associated with the investor's ability to sustain economic losses if the risk in some of the investments in the diversified portfolio materializes (Maula et al., 2005). Therefore, we predicted:

> **Hypothesis 6:**
> **H6.a.** There should be a positive relationship between higher working status and the investor's equity crowdfunding experience.
> **H6.b.** There should be a positive relationship between the investor's working status and his/her risk diversification strategy in equity crowdfunding.

1.7. Investor profile

We expect that previous investment experience in equity crowdfunding should be positively related to the investor's previous expertise in other financial instruments. Previous financial investment experience should improve the individual's perception of his/her ability to select suitable investment targets and control these investments for an optimal outcome (Maula et al., 2005). Prior research on business angels corroborated that these investors typically have a background as investors in other startups (Freear et al., 1994; Mason and Harrison, 2000; Politis and Landström, 2002). Politis and Landstrøm (2002) found that investors have commonly experienced three overall career phases: the corporate career phase, the entrepreneurial learning phase, and the integrated investment career phase. The literature of venture capital states that the share of investors being company-owners are 38% in Norway (Reitan and Sørheim, 2000), 48% in Japan (Tashiro, 1999), 49% in the United Kingdom (Harrison and Mason, 1992) to 69% in Sweden (Landström, 1993). In the same studies, the shares of investors having

founding experience have been 46% in Norway, 67% in the United Kingdom, and 96% in Sweden. Potential or novel investors tend to view investing on a smaller scale and are more likely to seek diversification in entrepreneurial ventures than active investors (Freear et al., 1994). Erikson, Sørheim, and Reitan (2003) found that there could also be differences among business angel investors, suggesting that family angels expose themselves to a higher firm-specific risk, representing that the family angels are less diversified in the number of ventures invested than other informal investors. We expect previous investment experience to be a significant determinant of the investor expertise and risk diversification in equity crowdfunding. Therefore, we predicted:

Hypothesis 7:
H7.a. There should be a positive relationship between the type of investor and the investor's equity crowdfunding experience.
H7.b. There should be a negative relationship between the type of investor and his/her risk diversification strategy in equity crowdfunding.

2. Methodology

2.1. Survey and data collection

Previous research showed that it was difficult to identify investors (Harrison and Mason, 1992; Landström, 1993; Wetzel, 1983) and that investors tend to be reluctant to participate in a study because they prefer to remain anonymous (Erikson et al., 2003). R. T. Harrison and Mason (1992) describe three methods of identifying investors: (a) sending questionnaires to a large number of individuals assumed to have made investments, (b) contacting the investors through the companies in which they have made investments, and (c) using the so-called "snowball method" to identify investors. Our approach used a combination of the two first ones, contacting individuals assumed to be investors through four different forum groups on LinkedIn related to equity crowdfunding. We posted the study's objectives and a link to the survey for each group on LinkedIn. We also identified some investors willing to answer the survey, and we sent an InMail with a link to the questionnaire.

We surveyed the investors through an online questionnaire using cloud-based software. This approach allowed us to reach investors from different geographical regions, thus targeting a much wider collectivity. We gathered the investors' sample in this research across three countries: Germany, the Netherlands, and Spain. We obtained 242 valid answers, having disregarded

all incomplete survey responses. Considering that the four focus groups' participants summed up 45,012 members, the number of answers constitutes a statistically significant sample, with a confidence of 90%, maximum indetermination p=q=0.5, and an error margin of 6%.

2.2.Variables related to the investor's demographics

This study used gender, age, education, working status, income, and type of investor in equity crowdfunding as independent variables to study the differences in investment knowledge and risk diversification among the investors. Appendix 1 summarizes the definition of the variables and how we constructed them.

For this study, we categorized the investor profiles using the following definitions:

1. *Everyday investor* not having invested (and will not invest) more than 10% of his/her net assets per year in shares, bonds, funds, or other securities not listed on a stock exchange. The Financial Conduct Authority in the United Kingdom refers to 'Everyday Investors' as 'Restricted Investors.'

2. *Sophisticated investor*, when one of the following holds: has invested in more than one unlisted company; is a director of a company with an annual turnover of at least €1 million; has worked in private equity in the last two years or has been a member of a business angel's network for at least the last six months.

3. *High Net worth Investor*: earning more than €100,000 per year, or holding net assets of at least €250,000.

2.3.Variables related to the investor experience

To obtain dependent variables for our study, we have considered several characteristics related to the respondents' previous investment experience, gathered using the study mentioned above. We have taken into account both characteristics related to the investments made by our respondents using crowdfunding platforms (number of companies invested in; the amount of money invested in each one) and related to their experience in other markets (stock market, bond market, private equity, ETF). Appendix 2 displays the particularities of each of these variables.

Furthermore, we used both Pearson's chi-square test and Fisher's exact test to study the sample's homogeneity within the three different countries of residence of the respondents, taking into account all other variables used in

the study. **Error! Reference source not found.** shows the results. The large p-values throughout the table show that the null hypothesis can be accepted, and therefore respondents in the three different countries exhibit similar trends. This result allows us to consider our sample as homogenous for our study.

2.4. Methodology

Our analysis's starting point is using a Principal Component Analysis (PCA) to reduce the dimension of the number of dependent variables initially considered (Jolliffe, 2002; Wold, Esbensen, and Geladi, 1987). Before that, we shall run several standard tests to ensure the suitability of the approach. According to our first hypothesis, the resultant components should represent the different investment strategies in equity crowdfunding primary followed by investors.

Table 1. Sample homogeneity

Variable	Chi-square p-value	F – exact test p-value
GEN	.139	.130
EDU	.220 *(a)*	.195
HOUINC	.848 *(a)*	.833
WRKSTA	.452 *(a)*	.457
INVPROF	.888	.907
#COMINV	.673 *(b)*	.749
#INVCAM	.232 *(b)*	.254
STOMARK	.290	.294
BONMARK	.077	.082
PRIVEQU	.812	.854
ETCDER	.746	.788

(a) 1 group with less than 5 observations   *(b)* 2 groups with less than 5 observations

We subsequently use multivariate regression analysis to test the remaining hypotheses. The objective is to find relationships between our independent variables (gender, age, education, household income, work status, and type of investor) and the obtained investment strategies, represented by the equations:

$$\mu_i = \alpha_i + \sum_j \beta_{ij} c_j + \gamma_i a + \delta_i a^2 \quad \forall i$$

where

$\alpha, \beta_j, \gamma, \delta$ refer to the regression coefficients for each equation

c stands for the characteristics of the demographics qualitative variables

a represents age (the quadratic term is included considering H3b)

μ_i denotes each one of the equity crowdfunding primary investment strategy

3. Results and discussion

3.1. Sample description

Error! Reference source not found. provides the demographical characteristics of the sample. According to our results, a typical investor in equity crowdfunding is male, aged between 36 and 45, holds a University degree, household income amounts under €30,000, and works in a managerial position. Furthermore, he is neither a sophisticated investor nor a high-net-worth investor.

Error! Reference source not found. describes the investor's experience in the equity crowdfunding ecosystem and other financial instruments. According to our results, most investors have invested in only one company; typically, they invest between €500 and €1,000 and have limited experience in other financial instruments such as stocks of public companies, fixed income securities, stocks in private equity derivatives.

3.2. Principal component analysis

As outlined in the previous section, we have used a Principal Component Analysis to reduce the number of variables describing the investors' experience, both in crowdfunding and other markets. To ensure the approach's suitability, we have first used the KMO test, obtaining a median level of 0.7. Furthermore, Bartlett's sphericity test, significant at p-value < 0.000, also shows that the PCA is well suited and can reduce dimensions and variables in the model (see **Error! Reference source not found.**).

Table 2. Survey description investors' demographic variables

Variable	Descriptor	Participants	%
Observations		242	100
Gender	Female	39	16
	Male	203	84
Age	18-25	23	10
	26-35	75	31
	36-45	78	32
	46-55	64	26
	56-65+	2	1
Education	Trade/technical/vocational	28	12
	Bachelor's degree	117	48
	Post-graduate degree	97	40
Household income	under €30,000	111	46
	€30,001 and €50,000	69	29
	€50,001 and €100,000	35	14
	more than €100,000	27	11
Working status	Entry-level	34	14
	Analyst/associate	77	32
	Manager	100	41
	Owner/shareholder	31	13
Investor profile	Everyday investor	158	65
	Sophisticated investor	38	16
	High net worth investor	46	19

Using parallel analysis, we found that, for our data, a total of two components were optimal for our analysis. The scree plot of **Error! Reference source not found.**, with only two eigenvalues above 1, also visually assesses the choice.

Error! Reference source not found. presents the loading values obtained for each variable in each of the two components considered. We displayed only loading values of more than 0.25 to enhance the significance of the components. With the highest explanatory value, the first component consists of investors that allocate comparatively larger quantities in equity crowdfunding and invest in all other financial instruments considered in the

survey (stocks in publicly listed companies, bonds or fixed-income investments, private equity in non-listed companies, and derivatives). Therefore, we have termed the component *Expertise* since it represents the investors with relatively more expertise in investment, both in the equity crowdfunding ecosystem and elsewhere.
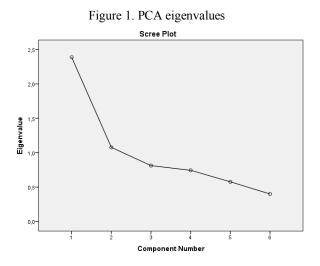
Figure 1. PCA eigenvalues

Table 3. Survey description investor's experience variables

Variable	Descriptor	Participants	%
Observations		242	100
Number of equity crowdfunding companies invested	1 company	138	57
	2 to 5 companies	94	39
	More than 5 companies	10	4
Amount of money invested per campaign	under €500	75	31
	€501 and €1,000	110	45
	€1,001 and €5,000	39	16
	more than €5,000	18	7
Experience in stock market	Yes	97	40
	No	145	60
Experience in bond market	Yes	75	31
	No	167	69
	Yes	54	22

Experience in private equity	No	188	78
Experience in ETF	Yes	46	19
	No	196	81

Table 4. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.698
Bartlett's Test of Sphericity	Approx. Chi-Square	239.656
	Df	15
	Sig.	.000

Table 5. Factors for the investors' experience

	Expertise (EXPERT)	Risk Diversification (RSKAVR)
Number of equity crowdfunding companies invested in		.905
Amount of money invested per campaign	.599	-.289
Experience in stock market	.660	.320
Experience in bond market	.745	
Experience in private equity	.633	
Experience in ETF	.774	
% of Cumulative Variance explained	39.804	57.766

The second component consists of investors that consider investments in more than one project using equity crowdfunding but in smaller quantities. Although these investors show some previous experience investing in the stock market, we have termed this factor *Risk Diversification* because they use the investor's equity risk diversification strategy in the equity crowdfunding ecosystem, investing in many different projects, thus reducing risk in their portfolio of stocks and allocating smaller sums of money to each project.

Our hypothesis 1 predicted that there should be different strategies considered among equity crowdfunding investors. Results show that our hypothesis holds and allows us to identify two different strategies: *(a)* the expertise strategy followed by investors with prior experience in investment in different financial instruments; and *(b)* the equity risk diversification strategy.

3.3.Regression analysis

Error! Reference source not found. provides the results for the two multivariate regressions undertaken. Model 1 considers the investors' expertise as a dependent variable, whereas Model 2 considers the risk-averse investors. We considered the same independent variables (gender, age, education, household income, working status, investor profile) in both cases.

We can use the resultant regression coefficients and statistical significance to discuss hypotheses 2 to 7 stated above. A summary of the derived results, including H1, can be seen in Appendix 3.

Table 6. Regression analyses

Model	Model 1		Model 2	
	B	**Sig.**	**B**	**Sig.**
(Constant)	.409	.707	-2,777	.015
GEN	-.064	.688	.331	.046**
AGE	-.087	.129	.078	.194
AGE^2	.001	.187	-.001	.201
EDU	.026	.785	.295	.003***
HOUINC	.174	.022**	-.008	.923
WRKSTA	.364	.000***	.317	.000***
INVPROF	.097	.305	-.269	.007***
R^2	.479		.396	
Dependent variable	EXPERT		RSKAVR	

Concerning the investors' gender, H2a predicted a positive relationship between gender and the investor's expertise. Though not supported by our results, the hypothesis is not supported since there seems to be no significant relationship between gender and the expertise strategy. Turning to H2b, we predicted a relationship between gender and the risk diversification strategy in equity crowdfunding. In this case, hypothesis H2b is partially supported since the relation indeed is statistically significant. However, its sign is reversed, with more male investors significantly using this strategy, contrary to the stated hypothesis.

The test supported a statistically significant relationship between the investors' age and the two dominant investors' strategies in Hypothesis 3. However, neither H3a nor H3b is supported due to the regression coefficients' lack of significance in both regressions.

We found that the proposed relationship with the other two demographic characteristics of the equity crowdfunding investors in our sample is partially supported. Concerning the investors' level of education, there is indeed a statistically significant relationship found between the investors' level of education and his/her use of the risk diversification strategy in equity crowdfunding. However, we found the relationship to be positive, with more educated investors making increased use of this strategy, and therefore the sign of the relationship is reversed concerning what we initially predicted in H4b. The first part of this hypothesis concerning the relationship between the investors' level of education and his/her use of the prior expertise strategy is not confirmed.

We confirmed a positive and significant relationship between the household income and the investor's prior expertise in H5b. However, we did not find any statistical significance between the household and the risk diversification strategy, even though we confirmed that the relationship's sign was negative.

Hypothesis 6, stating a positive relationship between the investors' working status and both the equity crowdfunding prior experience (H6a) and the risk diversification strategy (H6b), is supported by our results. In both cases, the found regression coefficients are positive and statistically significant.

Finally, we find Hypothesis 7 also partially supported. It predicted a positive relationship between the type of investor and the investor's equity crowdfunding prior experience strategy, with more sophisticated investors increasingly using such strategy. From our results, the relationship seems to be positive but not statistically significant. Hypothesis 7b predicted a negative relationship between the type of investor and his/her risk diversification strategy in equity crowdfunding, and indeed the obtained coefficient is negative and statistically significant.

4. Conclusions

This paper examined the factors explaining the investor's expertise and risk diversification strategies in the equity crowdfunding ecosystem. Building on

personal investment literacy and household portfolio literature frameworks, we developed hypotheses concerning the factors influencing the investor's expertise and risk diversification strategy in equity crowdfunding. We tested the hypotheses using data collected from 242 equity crowdfunding investors. Proxies-dependent variables were calculated for the investor's expertise and risk diversification strategy in equity crowdfunding using principal component analysis and multivariate regressions to test the hypothesis.

In contrast to what prior empirical research suggest, including in the personal investment literacy literature and the economic literature of household portfolios, demographic factors such as gender, age, or level of formal education were not highlighted as statistically significant in our empirical analysis in explaining the investor's expertise in equity crowdfunding. Conversely, household income and working status were critical determinants of this equity crowdfunding strategy. It seems that learned skills and solid financial wealth matter more than demographics explaining the investor's expertise in picking stocks in equity crowdfunding.

After examining the determinants of the risk diversification strategy in equity crowdfunding, we found that formal education, working status, and the own assessed investor profile had statistical significance in explaining the relationship. According to our results, we expect that individuals with a higher level of formal education, higher working status, and lesser investment experience would diversify more and spread the risk when allocating money in early-stage startups through equity crowdfunding projects. However, either age or the Investor's wealth and income level would not be good predictors of the risk diversification strategy.

In the search for possible further tentative explanations of the differences in the results found by this research compared to other previous research both in personal investment literacy and household portfolio literature, we discuss in the next paragraphs those differences.

65% of the respondents of our sample were everyday investors. These results align with Hooghiemstra and de Buysere (2015), which argue that most crowdfunding investors are unsophisticated. To protect investors regarding limited information, voting, and exit rights, regulators in diverse European countries have introduced restrictions on the offering or the companies' making the offerings to minimize possible Investor' losses. Specific legal measures to protect investors in equity crowdfunding, however, vary from

country to country. In Finland, France, and Germany, they rely primarily on investor disclosure; Spain relies on a combination of self-certification and a maximum cap per project/participation (Pope, 2011); while Italy and the United Kingdome rely solely upon the self-certification of investors (Hooghiemstra and de Buysere, 2015).

Many inexperienced investors seek advice and help from their bank account managers or broker-dealers when they set out to pick company stocks (Abreu and Mendes, 2010). However, similar characters do not exist in the equity crowdfunding ecosystem. Not only younger investors but also the ones at the lower tier in education have to deal with the excessive amount of information on the Web, which creates many difficulties for them in understanding and using all the information (Brynjolfsson and Smith, 2000). Doing what others do could be an efficient and rational way to make decisions in this circumstance (Lee and Lee, 2012). Nowadays, it is also easy to observe others' choices on the Internet. The equity crowdfunding platforms allow the inexperienced and newcomer investor to take such strategies because they could believe that others are better informed than they are. This situation could explain why some investors' demographic characteristics were not significant for this study, whereas they were good predictors of investors' behavior in other contexts.

Researchers suggest that men have better accessibility to top management position, Graham, Harvey, and Puri (2013) and Huang and Kisgen (2013) reported that a large proportion of Chief Executive Officers and Chief Financial Officers are men. Pini (2005) argued that until there is a conceptual shift away from maintaining the status quo to strategic equity management by the power holders, women will continue to be under-represented in management. According to French and Strachan (2009), organizations in the finance industry needed to consider different and proactive strategies for developing, promoting, and transferring women to ensure their movement and, ultimately, their retention within management. Despite these differences in career opportunities to access top managerial positions, Harrison and Mason (2007) stated that there are no differences in the financial performance between women and men in the business angel industry. Even though Hervé, Manthé, Sannajust, and Schwienbacher (2016), in research for equity and real estate crowdfunding, argued that decision-making in finance is mainly a masculine prerogative, women probably would acquire the same level of expertise. They would also assess the risk diversification strategy in similar ways than men in the long term in the equity crowdfunding ecosystem.

Finally, Kim and Viswanathan (2014) found that expert investors in the crowdfunding markets play a disproportionate role in influencing younger and early investors' behavior in these markets. Experience and mature investors deciding on venture capital or a business angel can influence the equity crowdfunding ecosystem when they invest in an equity crowdfunding project signaling the equity crowdfunding market the entrepreneur's projectability to attract subsequent capital. Janney and Folta (2006) stated that these private equity investors are trained and have the experience to moderate and understand this endorsement effect. However, the crowd of anonymous participants does not have those capabilities because the private equity investors consider them less sophisticated, paying too much attention to what they believe is quality information. This argument can explain why the hypothesis regarding the type of investor and the investor's crowdfunding experience was not supported. Many equity crowdfunding investors can be signaled by other more expert investors, like representing business angels and venture capitalists and following a herding behavior.

Appendix 1. Variables related to the investor's demographic profile

Variable	Description
Gender – GEN	Dummy variable taking value 1 for male investors, and 0 for female investors
Age – AGE	Age of the respondent at the time he/she answered the survey It was obtained from the online survey, asking for the investors' *Year of birth*
Education – EDU	Qualitative variable, categorized 1 for trade-technical or vocational education, 2 for formal university education, and 3 for post-graduate education. Data obtained from the online survey asking: *What is the highest degree or level of school completed?*
Country of Residence – RES	Qualitative variable categorized DE for Germany, NL for the Netherlands, and ES for Spain. Data obtained from the online survey, asking: *Country of residence*
Household income – HOUINC	Qualitative variable, categorized 1 for income less than €30.000, 2 for income between €30.001 and €50.000, 3 for income between €50.001 and €100.000, and 4 for income of more than €100.000. Data obtained from the online survey through the question: *What is your total household income?*
Work status – WRKSTA	Qualitative variable categorized 1 for intern or entry level at the organization, 2 for analyst or associates, 3 for manager positions, and 4 for owners or shareholders. Data obtained from the online survey, asking for: *Which of the following most closely matches your job title?*
Investor profile – INVPROF	Qualitative variable categorized 1 for everyday investor, 2 for sophisticated investor, and 3 for high net worth investor. Obtained from the online survey, asking: *Which profile describes you best?*

Appendix 2. Variables related to investors' experience

Investor's experience	Description
Number of equity crowdfunding companies invested in – #COMINV	Qualitative variable categorized 1 for investment in one company; 2 for investments in between 2 and 5 companies, 3 for investments in more than five companies. Obtained from the online survey, asking: *In how many companies have you invested using a crowdfunding platform?*
Amount of money invested per campaign – #INVCAM	Qualitative variable categorized 1 for investments less than €500, 2 for investments between €500 and €1.000, 3 for investments between €1.001 and €5.000, and 4 for investments of more than €5.000. Obtained from the online survey, asking: *What is the average amount of money invested per company using a crowdfunding platform?*
Experience in stock market – STOCKMARK	Dummy variable taking value 1 if the investor has allocated money in shares at companies listed on the stock exchange; 0 otherwise. Obtained from the online survey, asking: *Before investing in equity crowdfunding, did you invest in company shares listed at any stock exchange?*
Experience in bond market – BONDMARK	Dummy variable taking value 1 if the investor has allocated money in bonds or any other fixed-income financial instruments; 0 otherwise. Obtained from the online survey, asking: *Before investing in equity crowdfunding, did you invest in bonds or other fixed-income financial instruments?*
Experience in private equity – PRIEQU	Dummy variable taking value 1 if the investor has allocated money in private equity or non-stock exchange-listed company; 0 otherwise. Obtained from the online survey, asking: *Before investing in equity crowdfunding, did you invest in private equity or non-stock exchange-listed company?*
Experience in ETF – ETFDER	Dummy variable taking value 1 if the investor has allocated money in derivatives, forwards contracts, futures, swaps, options and/or other financial instruments of the same type and risk; 0 otherwise. Obtained from the online survey, asking: *Before investing in equity crowdfunding, did you invest in ETF derivatives: Forwards contracts, futures, swaps, options, and/or others?*

Appendix 3. Summary of hypotheses and results

H1. Equity crowdfunding investors exhibit investment strategies reflecting their prior expertise and level of risk diversification	Supported

H2. Relationship between gender and dominant investment strategies:
    a. Male investors make significant use of their prior investment expertise
    b. Female investors will prioritize risk diversification strategies
	Non supported
	Part. supported
	(male inv.)

H3. Relationship between age and dominant investment strategies:
    a. Positive relationship between age and investors' prior investment expertise
    b. Curvilinear (inverted-U shaped) relationship between investor's age and its risk diversification strategy in equity crowdfunding
	Non supported

H4. Relationship between education and dominant investment strategies:
    a. Positive relationship with the use of their prior investment expertise.
    b. Negative relationship with his/her risk diversification strategy.
	Non supported
	Part. supported
	(positive rel.)

H5. Relationship between the investor's wealth and income and dominant investment strategies:
    a. Positive relationship with his/her prior investment expertise.
    b. Negative relationship with his/her risk diversification strategy.
	Supported
	Non supported

H6. Relationship between working status and dominant investment strategies:
    a. Positive relationship with the investor's prior investment expertise.
    b. Positive with its risk diversification strategy in equity crowdfunding.
	Supported

H7. Relationship between the type of investor and dominant investment strategies:
    a. Positive relationship with his/her prior investment expertise.
    b. Negative relationship with his/her risk diversification strategy.
	Non supported
	Supported

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