Navigating Uncertainty in Equity Crowdfunding

Flemming Binderup Gammelgaard, Claus Bossen
Aarhus University
publications18@aaai.org

Abstract

This conceptual paper focuses on how equity crowdfunding investors navigate uncertainty in their decision-making. We demonstrate shortcomings of prior research focusing on the attributes that are assessed in micro-investment decision-making without considering the heuristic processes by which these attributes are appraised. To overcome these shortcomings, we propose the development of a comprehensive model of micro-investment decision-making, the first of its kind to our knowledge.

Introduction

Equity crowdfunding is an online mechanism for attracting financial contributions from large numbers of individual investors through public offerings of unlisted shares (Ahlers et al. 2015; Cholakova and Clarysse 2015; Ley and Weaven 2011). Contributions are typically micro-investments in early-stage entrepreneurial ventures operating in rapidly changing and highly uncertain environments. Consequently, equity crowdfunding is uniquely suited for studying micro-investment decision-making under the conditions of uncertainty surrounding early-stage entrepreneurial ventures. The purpose of the current study is therefore to determine how micro-investors make decisions under uncertainty in equity crowdfunding.

To investigate how micro-investors navigate uncertainty in their decision-making, we review the emerging equity crowdfunding literature. Due to limited research on equity crowdfunding, we furthermore turn to the entrepreneurial finance literature for theory on investment decision-making, and to the decision-making literature for insights into decision-making under uncertainty.

To the best of our knowledge, no prior study has systematically analyzed crowdfunding within the theoretical framework of decision-making under uncertainty. We consequently make two contributions to the crowdfunding literature: 1) we provide the to date most comprehensive overview and classification of the constituent elements of micro-investment decision-making, and 2) based on this overview and classification, we develop the first comprehensive model of how investors make decisions under uncertainty (both to be included in the full paper).

Crowdfunding

Crowdfunding is a subset of crowdsourcing defined as the act of outsourcing a task to an undefined network of people in the form of an open call that is broadcast online (Afuah and Tucci 2012; Howe 2006; Jeppesen and Lakhani 2010). Like crowdsourcing, crowdfunding too involves an open call, in this case for financial contributions from mostly non-accredited investors participating in offerings online outside traditional financial institutions (Belleflamme, Lambert, and Schwienbacher 2014; Lambert and Schwienbacher 2010; Schwienbacher and Larralde 2010). Thus, crowdfunding can be defined as a mechanism for securing small contributions from a large number of individuals through social networking sites outside the main financial system (Ley and Weaven 2011).

In recent years, crowdfunding has become an increasingly viable alternative to conventional sources of early-stage capital. The most recent global crowdfunding industry report estimated crowdfunding volume in 2015 at $34.4 billion globally, up from $16.2 billion in 2014 and $6.1 billion in 2013 (Massolution 2015). The industry showed continued growth in 2016 to a market volume of $35.2 billion in the Americas alone with more than 218,000 businesses across the Americas raising funds from online alternative finance channels in 2016 (Ziegler et al. 2017).

Research on Crowdfunding

In addition to its significant practical applications, crowdfunding is an emerging research area, which has gained momentum with an increasing number of publications over the

past decade. This literature is mostly empirical, and overwhelmingly focused on identifying determinants of funding success to further our understanding of the factors that support successful funding outcomes (see e.g. Koch 2016; Kuppuswamy and Bayus 2013; Schwienbacher 2017). However, most crowdfunding studies have failed to go beyond identifying the drivers of funding success toward a theoretically grounded understanding of their role in investment decision-making. As a result, the influencing factors of investment decision-making tend to be reduced to determinants of funding success, and the construct of success determinants consequently serves as the lowest common denominator of the literature.

The current study seeks to remedy these shortcomings by developing the first comprehensive model of micro-investment decision-making under uncertainty. Based on our review of the crowdfunding literature, we argue that as the quality of entrepreneurial ventures is unobservable under uncertainty, micro-investors must base their investment decisions on observable quality signals assumed to co-vary with the underlying, but unobservable quality of investment opportunities (Ahlers et al. 2015; Agrawal, Catalini, and Goldfarb 2014; Belleflamme and Lambert 2014; Burtch 2013; Mollick 2014).

Consequently, investment decisions rely on a range of quality signals, which can be observed, and which are therefore the success factors identified in the literature. However, while previous studies have provided important groundwork on factors influencing the performance of crowdfunding projects, they have stopped short of conceptualizing these in terms of the decision-making process to which they contribute (Kang et al. 2016). To the best of our knowledge, our study is therefore the first to analyze how quality signals trigger a kind of cognitive shortcut in the decision-making process by substituting for the underlying, but unobservable quality of the investment opportunity, and thereby reducing uncertainty for potential investors.

Quality Signals

As outlined in the previous section, quality signals are typically conceptualized as funding success factors in the literature. In their review of the crowdfunding literature, Belleflamme and Lambert argue that “contributors respond to quality signals” in equity crowdfunding, and conclude that equity crowdfunding is most successful when entrepreneurs reduce uncertainty for potential investors by signaling quality (p. 4). This line of argument is based partly on the study by Ahlers and his co-authors (2015), who demonstrate empirically that quality signals may "strongly impact the probability of funding success", and consequently classify quality signals as “determinants of funding success” (p. 955 and Figure 1).Yet, they stop short of analyzing the role that quality signals play in investment decision-making, and ultimately conclude that "further analysis would be needed to understand ... individual investors' decision-making processes" (ibid., p. 975).

Finally, in his highly cited paper on the dynamics of crowdfunding, Mollick (2014) finds that potential investors respond to quality signals in all forms of crowdfunding, before coming to the conclusion that “projects that signal a higher quality level are more likely to be funded” (p. 2). However, as signaling is less well defined in crowdfunding than in “traditional new venture settings”, Mollick recommends further research into "the decision-making process in crowdfunding to gain insight into the ... signaling process." (ibid., p. 14).

Thus, these studies all focus on quality signals as determinants of funding success, while acknowledging that little is known about the significant role that quality signals play in investment decision-making. Furthermore, the list of quality signals discovered in the literature is arguably so long and categories so unstable as to provide confusing and often contradictory evidence concerning their role in the decision-making process. Consequently, our key contribution in the following is to demonstrate how micro-investors use heuristics to appraise quality signals, and make decisions under uncertainty. We thereby account not only for the factors that inform the decision process, but also for the process by which these factors are appraised.

Crowdfunding Heuristics

According to the heuristics and biases program, heuristics can be defined as a cognitive process in which a highly accessible attribute is substituted for a less accessible attribute of a judgment object to reduce the complexity of a particular judgement (Kahneman 2003). Consequently, a judgement is mediated by a heuristic when an individual assesses a property of a judgment object by substituting another property of that object (Kahneman and Frederick 2002). This heuristic process of attribute substitution controls decision-making when the following three conditions are satisfied: 1) target attributes are relatively inaccessible; 2) related substitute attributes are highly accessible; and 3) the substitution of heuristic attributes for target attributes takes place intuitively, and is not overruled by higher-order cognition (ibid.).

In equity crowdfunding, all three conditions are typically satisfied as information asymmetry and uncertainty make investment target attributes inaccessible, forcing micro-investors to rely instead on highly accessible quality signals. Consequently, the various quality signals discovered in the research can be characterized as heuristic attributes substituting for the underlying, but unobservable target attributes under information asymmetry and uncertainty.

As micro-investors cannot possibly take all possible quality signals into consideration, they furthermore use specific decision-making heuristics to ignore some of the information, and come to a decision (see e.g. Gigerenzer 2008, Table 2 for an overview of 10 different heuristics). Decision-making heuristics are strategies of bounded rationality that ignore information to make more accurate judgments than strategies that use more information and computation, for instance under uncertainty (Gigerenzer and Gaissmaier 2011). These heuristics determine where to search for cues (search rules), when to stop searching without computing an optimal stopping point (stopping rules), and how to make a decision after search is stopped (decision rules) (Gigerenzer and Gaissmaier 2011; Goldstein and Gigerenzer 2002).

In the crowdfunding setting, quality signals serve as cues, whereas the relevance of specific cues and their cue values depends on investor decision criteria and their choice of decision-making heuristics. Several heuristics would appear be relevant in the crowdfunding context, including social heuristics such as imitate-the-majority, which investors arguably use when basing their investment decisions on the quality signal provided by capital accumulated in the course of a crowdfunding campaign (Agrawal, Catalini, and Goldfarb 2015).

Ultimately, heuristics thus enable micro-investors to base their decisions on quality signals substituting for unobservable attributes of potential investment targets, and to prevent paralysis by analysis given the huge number of investment opportunities and even greater number of quality signals associated with these opportunities. Without heuristics, micro-investors would struggle to process a potentially overwhelming amount of information, while simultaneously being overwhelmed by information asymmetry and uncertainty.

Discussion

While discovering a wide range of signals that inform the investment decision, crowdfunding research has largely neglected the process whereby investors make decisions. Consequently, this line of research does not observe how quality signals substitute investment target attributes in the decision-making process, or how this heuristic process of attribute substitution leads to intuitive, gut feel decisions.

As the quality of early-stage entrepreneurial ventures is difficult to gauge due to information asymmetry and uncertainty, micro-investors must base their decisions on a range of quality signals that substitute for the underlying, but unobservable quality of the investment opportunity. As such, these quality signals are heuristic attributes substituting for target attributes that are unobservable due to uncertainty, information asymmetry and the unknowable quality of early-stage entrepreneurial ventures (Ahlers et al. 2015; Huang and Pearce 2015).

We therefore posit that it would not be possible for micro-investors to make decisions under conditions of uncertainty if they did not use heuristics, as they cannot possibly employ a fully compensatory decision-making model to balance out large numbers of attributes under these conditions. Instead, they use non-compensatory decision-making heuristics to reduce the number of investment opportunities, and identify their investment targets by focusing on quality signals relevant to their decision criteria, which in turn are derived from their objectives and motivations. As such, the focus on heuristic attribution amounts to a first step towards modeling observable phenomena and their relationships. In our forthcoming full paper, we will therefore present the first comprehensive model of micro-investment decision-making, which will include not only quality signals and heuristics, but also investor decision criteria, motivations and objectives.

The implications are manifold as failing to fully understand the process of decision-making at the core of crowdfunding, and focusing on quality signals, as crowdfunding success factors will likely cause all kinds of problems for researchers and practitioners within the field. Unless the role of quality signals as heuristic attributes is understood, using these quality signals to ensure crowdfunding success is bound to be hit and miss. Not only is the list of quality signals discovered in the literature long, but also the list is continuously growing, as there is no natural limit to how quality may be signaled to reduce uncertainty for potential investors. Quality signals should therefore be studied in their own right as low-level constructs, but more important is the function of these constructs in the decision-making process.

Both from a theoretical and practical perspective, we need to turn to the process of decision-making rather than the laundry lists of quality signals produced in the literature to understand how quality signals may trigger an investment decision by matching the decision criteria that micro-investors derive from their objectives and motivations. Ultimately, this will deepen our understanding of how micro-investors make decisions, shedding important light on how they use heuristics to guide their decision-making under uncertainty, when all they have to go by are a range of ambiguous quality signals thought to co-vary with the underlying, but unobservable quality of potential investment targets.

Finally, this approach offers rich opportunities for further research. The model proposed in this paper is empirically grounded to the degree that it is based on previous empirical studies, but the model itself has yet to be empirically tested in a set-up where the decision-making process is the focus of the research, and where the different factors are therefore not reduced to determinants of crowdfunding success as the lowest common denominator of crowdfunding research.

References

Afuah, A., and Tucci, C.L. (2012). Crowdsourcing as a solution to distant search. *Academy of Management Review* 37(3): 355-375.

Agrawal, A.; Catalini, C.; and Goldfarb, A. 2010. The Geography of Crowdfunding. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1692661

Agrawal, A.; Catalini, C.; and Goldfarb, A. 2014. Some Simple Economics of Crowdfunding. *Innovation Policy and the Economy* 14(1): 63–97. https://doi.org/10.1086/674021

Agrawal, A.; Catalini, C.; and Goldfarb, A. 2016. Are Syndicates the Killer App of Equity Crowdfunding? *California Management Review* 58(2): 111–124. https://doi.org/10.1525/cmr.2016.58.2.111

Agrawal, A.; Catalini, C.; and Goldfarb, A. 2015. Crowdfunding : Geography , Social Networks , and the Timing of Investment Decisions. *Journal of Economics and Management Strategy* 24(2): 253–274. https://doi.org/10.1111/jems.12093

Ahlers, G. K. C.; Cumming, D.; Günther, C.; and Schweizer, D. 2015. Signaling in Equity Crowdfunding. *Entrepreneurship: Theory and Practice* 39(4): 955–980. https://doi.org/10.1111/etap.12157

Belleflamme, P., and Lambert, T. 2014. Crowdfunding: Some Empirical Findings and Microeconomic Underpinnings. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2437786

Belleflamme, P.; Lambert, T.; and Schwienbacher, A. 2013. Individual crowdfunding practices. *Venture Capital* 15(4): 313–333. https://doi.org/10.1080/13691066.2013.785151

Belleflamme, P.; Lambert, T.; and Schwienbacher, A. 2014. Crowdfunding: Tapping the right crowd. *Journal of Business Venturing* 29(5): 585–609. https://doi.org/10.1016/j.jbusvent.2013.07.003

Belleflamme, P.; Omrani, N.; and Peitz, M. 2015. The economics of crowdfunding platforms. *Information Economics and Policy* 33: 11-28. https://doi.org/10.1016/j.infoecopol.2015.08.003

Boudreau, K. J.; Jeppesen, L. B.; Reichstein, T.; and Rullani, F. 2015. Crowdfunding as 'Donations': Theory & Evidence. *Harvard Business School Working Paper*, No. 16-038. http://dx.doi.org/10.2139/ssrn.2669545

Bouncken, R. B.; Komorek, M.; and Kraus, S. 2015. Crowdfunding: The Current State Of Research. *International Business & Economics Research Journal (IBER)* 14(3): 407-416. https://doi.org/10.19030/iber.v14i3.9206

Burtch, G.; Ghose, A.; and Wattal, S. 2012. An Empirical Examination of the Antecedents and Consequences of Investment Patterns in Crowd-Funded Markets. *SSRN Electronic Journal*, *24*(3), 499–519. https://doi.org/10.2139/ssrn.1928168

Chase, V. M.; Hertwig, R.; and Gigerenzer, G. 1998. Visions of Rationality Summary. *Trends in Cognitive Sciences* 2(6): 206–214.

Cholakova, M., and Clarysse, B. 2015. Does the Possibility to Make Equity Investments in Crowdfunding Projects Crowd Out Reward-Based Investments? *Entrepreneurship Theory and Practice* 39(1): 145–172. https://doi.org/10.1111/etap.12139

Colombo, M. G.; Franzoni, C.; and Rossi-Lamastra, C. 2015. Internal social capital and the attraction of early contributions in crowdfunding. *Entrepreneurship: Theory and Practice* 39(1): 75–100. https://doi.org/10.1111/etap.12118

Dorff, M. B. 2013. The Siren Call of Equity Crowdfunding. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2325634

Gerber, E. M., and Hui, J. 2013. Crowdfunding. *ACM Transactions on Computer-Human Interaction*, 20(6): 1–32. https://doi.org/10.1145/2530540

Gigerenzer, G. 2003. Smart Heuristics. Retrieved March 14, 2016, from https://www.edge.org/conversation/gerd_gigerenzer-smart-heuristics

Gigerenzer, G. 2008. Why Heuristics Work. *Perspectives on Psychological Science* 3(1): 20–29. 10.1111/j.1745-6916.2008.00058.x

Gigerenzer, G., and Gaissmaier, W. 2011. Heuristic Decision Making. *Annual Review of Psychology* 62(1): 451–482. https://doi.org/10.1146/annurev-psych-120709-145346

Gigerenzer, G.; Hoffrage, U.; and Goldstein, D. G. 2008. Fast and Frugal Heuristics Are Plausible Models of Cognition: Reply to Dougherty, Franco-Watkins, and Thomas (2008). *Psychological Review*, *115*(1), 230–237. https://doi.org/10.1037/0033-295X.115.1.230

Gleasure, R. 2015. Resistance to crowdfunding among entrepreneurs: An impression management perspective. *Journal of Strategic Information Systems* 24(4): 219–233. https://doi.org/10.1016/j.jsis.2015.09.001

Goldstein, D. G.; Gigerenzer, G.; and Goldstein, D. G. 1996. Reasoning the Fast and Frugal Way: Models of Bounded Rationality. *Psychological Review* 103(4): 650–669. https://doi.org/10.1093/acprof

Hertwig, R., and Herzog, S. M. 2009. Fast and Frugal Heuristics: Tools of Social Rationality. *Social Cognition* 27(5): 661–698. https://doi.org/10.1521/soco.2009.27.5.661

Hornuf, L., and Schwienbacher, A. 2016. Crowdinvesting: angel investing for the masses? *Handbook of Research on Venture Capital* 3: 381–398). https://doi.org/10.4337/9781783471720.00024

Howe, J. 2006. The rise of crowdsourcing. *Wired, 14(6)*, 1-5.

Huang, L., and Pearce, J. L. 2015. Managing the Unknowable: The Effectiveness of Early-stage Investor Gut Feel in Entrepreneurial Investment Decisions. *Administrative Science Quarterly* 60(4): 1-37. https://doi.org/10.1177/0001839215597270

Jeppesen, L. B., and Lakhani, K. R. 2010. Marginality and Problem-Solving Effectiveness in Broadcast Search. *OrganizationScience* 21(5):1016-1033.

https://doi.org/10.1287/orsc.1090.0491

Kahneman, D. 2003. A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist* 58(9): 697–720. https://doi.org/10.1037/0003-066X.58.9.697

Kahneman, D., and Frederick, S. 2002. Representativeness Revisited: Attribute Substitution in Intuitive Judgment. In D. Gilovich, Thomas; Griffin, Dale; Kahneman (Ed.), *Heuristics and Biases: The Psychology of Intuitive Judgment* (pp. 49–81). Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511808098.004

Kang, M.; Gao, Y.; Wang, T.; and Zheng, H. 2016 "Understanding the determinants of funders' investment intentions on crowdfunding platforms: A trust-based perspective", *Industrial Management & Data Systems,* 116(8): 1800-1819, https://doi.org/10.1108/IMDS-07-2015-0312

Koch, J.-A. 2016. the Phenomenon of Project Overfunding on Online Crowdfunding Platforms – Analyzing the Drivers of Overfunding. *Twenty-Fourth European Conference on Information Systems (ECIS)*, (September). Retrieved from http://ssrn.com/abstract=2808427

Kuppuswamy, V., and Bayus, B. L. 2013. Crowdfunding Creative Ideas: The Dynamics of Project Backers in Kickstarter. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2234765

Ley, A. 2011. Exploring Agency Dynamics of Crowdfunding in Start-Up Capital Financing. *Academy of Entrepreneurship Journal* 17(1): 85–111.

Lukkarinen, A.; Seppälä, T.; Fellow, S.; and Wallenius, J. 2016. Investor Motivations and Decision Criteria in Equity Crowdfunding. *Unpublished.*

Lukkarinen, A.; Teich, J. E.; Wallenius, H.; and Wallenius, J. 2016. Success drivers of online equity crowdfunding campaigns. *Decision Support Systems* 87: 26–38. https://doi.org/10.1016/j.dss.2016.04.006

Massolution. 2015. 2015CF: The crowdfunding industry report. Retrieved from http://reports.crowdsourcing.org/index.php?route=product/product&product_id=54#oid=1001_23_banner_38

Maxwell, A. L.; Jeffrey, S. A.; and Lévesque, M. 2011. Business angel early stage decision making. *Journal of Business Venturing* 26(2): 212–225. https://doi.org/10.1016/j.jbusvent.2009.09.002

Mollick, E. 2014. The dynamics of crowdfunding: An exploratory study. *Journal of Business Venturing*: 29(1): 1–16. https://doi.org/10.1016/j.jbusvent.2013.06.005

Muzyka, D.; Birley, S., and Leleux, B. 1996. Trade-Offs in the Investment Decisions of European Venture Capitalists. *Journal of Business Venturing* 11(4): 273–287. https://doi.org/10.1016/0883-9026(95)00126-3

Plummer, L. A.; Allison, T. H.; and Connelly, B. L. 2016. Better together? signaling interactions in new venture pursuit of initial external capital. *Academy of Management Journal* 59(5): 1585–1604. https://doi.org/10.5465/amj.2013.0100

Tversky, A., and Kahneman, D. 1974. Judgment under Uncertainty : Heuristics and Biases. *Science* 185(4157): 1124–1131. https://doi.org/10.1126/science.185.4157.1124

Vismara, S. 2016. Equity retention and social network theory in equity crowdfunding. *Small Business Economics* 46(4): 579–590. https://doi.org/10.1007/s11187-016-9710-4

Vulkan, N.; Åstebro, T.; and Sierra, M. F. 2016. Equity crowdfunding: A new phenomena. *Journal of Business Venturing Insights* 5: 37–49. https://doi.org/10.1016/j.jbvi.2016.02.001

Ziegler, T.; Reedy, E. J.; Le, A.; Zhang, B.; Kroszner, R. S.; and Garvey, K. 2017. Hitting Stride: The 2nd Americas Alternative Finance Industry Report. Cambridge Centre for Alternative Finance, University of Cambridge.