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Citation

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ABSTRACT

We assess the relative importance of project, product category, entrepreneur, and location effects on reward-based crowdfunding success. Applying variance decomposition analysis to a sample of 98,336 crowdfunding projects launched between May 2009 and May 2014 on the Kickstarter platform, we find that agency factors, specifically the project and entrepreneur effects, explain the highest relative variance (over 80% of total variance) across three crowdfunding success outcomes – pledge amount, number of backers, and funding success. Structural factors, specifically product category and location effects, have lower but still significant effects. Our study extends prior variance decomposition studies in strategy and entrepreneurship research by incorporating location effects and examining the nascent stage of firm formation. It also contributes to crowdfunding research by providing a systematic framework to compare key determinants of reward-based crowdfunding outcomes. The findings are of practical relevance to aspiring entrepreneurs seeking funding through reward-based crowdfunding platforms.

KEYWORDS: Crowdfunding, entrepreneurship, founders, venture financing, variance decomposition analysis

1. Introduction

Reward-based crowdfunding is an increasingly popular mode of financing for early stage startups. Crowdfunding platforms enable entrepreneurs to showcase their business ideas and raise funding from a large number of online backers (Bruton et al. 2015; Harrison 2013; Mollick 2014; Schwienbacher and Larralde 2012). Between May 2009 and December 2017, 137,000 projects have been successfully funded, raising over $3.4 billion from over 14 million backers on the Kickstarter platform, a leading reward-based crowdfunding site in the USA. Given the popularity of Kickstarter and other platforms, the crowdfunding phenomenon has significantly changed the financing modes for starting new ventures (Gamble, Brennan, and McAdam 2017; Harrison 2013; Mollick 2016).

The need to understand determinants shaping crowdfunding outcomes has recently emerged as an important research topic (e.g., Bellavitis et al. 2017; Belleflamme, Lambert, and Schwienbacher 2014; Harrison 2013; Mollick 2014). Scholars have utilized different theoretical frameworks to examine various determinants influencing crowdfunding success. Whereas economists and psychologists often rely on signaling or informational processing perspective to capture the effects of project quality cues, scholars using sociology perspectives, such as institutional and network theories, often examine the location effects of a project. Altogether, these studies have documented a myriad of determinants influencing crowdfunding outcomes, ranging from project-level determinants, such as product quality cues and video presentation, to location-level determinants, such as technology cluster and location culture (e.g., Agrawal, Catalini, and Goldfarb 2015; Allison et al. 2015; Bruton et al.; Kim and Hann 2015; Mollick 2014; Moss, Neubaum, and Meyskens 2015).

Despite these insights, we lack an overarching framework to theoretically organize these determinants and empirically compare their relative effects. Such a framework is critical for both research and practical purposes. For research purpose, the framework could help scholars to not only organize existing findings but also provide potential guidance for future research. Indeed, comparing relative effects of various determinants of crowdfunding success would be analogous to the studies in strategy and entrepreneurship that have considered the relative importance of industry, strategic group, firm, and CEO effects on firm performance (e.g., McGahan and Porter 2002; Short et al. 2007, 2009). For practical purpose, addressing this question can inform entrepreneurs on how to allocate their limited resources to effectively raise crowdfunding.

Following prior research (e.g., Karniouchina et al. 2013; Short et al. 2007, 2009), we use systems theory as a general framework to organize existing findings of crowdfunding research. The theoretical underpinnings of our work are in the classical strategy literature that explains the relative effects of firm and industry effects on organizational outcomes (e.g., Fitza 2014; McGahan and Porter 1997; Short et al. 2007). Systems theory views entrepreneurs, firms, and industries as distinct components connected within a large system and therefore should be studied together (e.g., Scott 1998; Scott and Davis 2007). A systems theory framework is particularly appropriate to studying the crowdfunding phenomenon as it involves entities across multiple levels. Indeed, crowdfunding projects are nested in product categories, which are in turn nested among entrepreneurs, who reside at different locations.

Based on this framework, we develop a hypothesis delineating and comparing the relative importance of location, product category, project, and entrepreneur effects on crowdfunding outcomes. We then conduct variance decomposition analysis (VDA) using a dataset from Kickstarter, a reward-based crowdfunding platform, to explore the relative importance of these effects on crowdfunding success. Our results demonstrate that the effect of agency factors (i.e., factors related to the entrepreneur and projects started by the same entrepreneur) overwhelmingly predicts greater variance in crowdfunding success compared with the effect of structural factors (i.e., factors related to product category and geographical location). These results remain qualitatively consistent with additional robustness tests.

The contribution of this study to crowdfunding research is that it the first, to the best of our knowledge, that provides a systems theory framework to organize key determinants and estimates their relative importance shaping crowdfunding outcomes. It extends research on the relative contribution of determinants in explaining firm performance (e.g., Karniouchina et al. 2013; Short et al. 2007, 2009) by examining firm performance at the nascent stage, i.e., success in raising funds to start a firm. It also

contributes to the systems theory framework used in firm versus industry debate literature by adding the location effects into the mix.

We begin by developing a central thesis using the systems theory framework. We proceed to detail Section 3 by describing our dataset, sample, and variance decomposition specification. We then present our results describing the relative importance of determinants affecting crowdfunding outcomes. Finally, we discuss our contributions, limitations, and directions for future research.

2. Determinants of reward-based crowdfunding outcomes

2.1. Systems theory framework on reward-based crowdfunding

Following prior research (e.g., Fitza, Matusik, and Mosakowski 2009; Short et al. 2007), we apply systems theory to investigate the determinants of reward-based crowdfunding outcomes. Systems theory focuses on examining the complexity among entities within a large system (e.g., Scott 1998). It views individual entities, such as entrepreneurs and firms, as inseparable from their environmental components, such as industries, product categories, and geographic locations. These elements are connected within a large system and should be examined together (e.g., Scott 1998; Scott and Davis 2007).

Management scholars have used systems theory approach to understand the relative effects of industry, firm resources, and CEOs or entrepreneurs on firm performance (Scott 1998; Short et al. 2007). As Short and colleagues (2007) suggest, this framework provides a conceptual basis for testing multiple levels of analysis because firms, industries, and other components are connected within a large system. Systems theory has also prompted others to call for the integration of phenomena across multiple levels. As crowdfunding is a phenomenon involving individual entities embedded within multiple levels, this framework is a suitable theoretical framework to examine the extent to which determinants across multiple levels influence crowdfunding outcomes.

Crowdfunding is a type of crowdsourcing, defined as "an act of outsourcing a task to a crowd" (Afuah and Tucci 2012, p. 355; see also Palacios et al. 2016). It is designed for entrepreneurs to raise funding from a large number of people, congregating on an online platform that links entrepreneurs with backers interested in providing a small amount of capital for entrepreneurial projects of their choice (Mollick 2014; Schwienbacher and Larralde 2012). Most forms of crowdfunding can be categorized into debt-, equity-, or reward-based. Debt-based crowdfunding refers to those projects borrowing money from the crowd with a pre-determined payback amount and period; equity-based crowdfunding refers to projects offering ownership in exchange of some amount of investment; reward-based crowdfunding refers to projects soliciting small donations from the crowd in exchange of some type of reward ranging from "thank-you" notes for donations to shipping of actual products or services (e.g., access to games, music, or movies) proposed in the project.

Although equity-based crowdfunding is projected to potentially change the landscape of venture financing most significantly, the corresponding investment regulations and legislations for equity-based crowdfunding in the USA have only been recently approved. Only a handful of states in the USA have passed legislations allowing equity-based crowdfunding. As a result, reward-based crowdfunding has been the most prevalent type for most US entrepreneurs as of today and is the focus of most scholars (e.g., Colombo, Franzoni, and Rossi-Lamastra 2015; Mollick 2014) including our study.

After a literature review on crowdfunding research and consultation with experts in this area, we identified a set of empirical studies investigating crowdfunding outcomes. With the lens of systems

theory, we examined these studies, identified their level of analyses, and found that crowdfunding projects nest into product categories, which are in turn nested among entrepreneurs, who reside in different locations. We thus categorize existing findings of these studies into four levels – project, product category, entrepreneur, and location effects – that determine crowdfunding outcomes. Table 1 provides a summary of our organization of past findings on crowdfunding.

Table 1. Summary of recent crowdfunding studies.

	Findings in prior crowdfunding research	Data sources
Project effect	• Project quality signals, such as video pitches, fewer spelling errors, product quality, project innovativeness, and introduction word count, lead to funding success (Bi, Liu, and Usman 2017; Chan and Parhankangas 2017; Courtney, Dutta, and Li 2017; Frydrych et al. 2014; Mollick 2014; Moss, Neubaum, and Meyskens 2015; Xu et al. 2016). • Prior funding increases subsequent contributions (e.g., Agrawal et al., 2015; Colombo, Franzoni, and Rossi-Lamastra 2015; Kuppuswamy and Bayus 2015; Zhang and Liu 2012). • Project presentations shape funding outcomes (e.g., Allison et al. 2015; Bi, Liu, and Usman 2017; Marom and Sade 2013; Mollick 2014; Xu et al. 2014). • Project name influences funding success (Chan et al., Chan and Parhankangas 2017)	• 34 successful artists on Sellaband (Agrawal et al., 2015) • 36,665 loans on Kiva (Allison et al. 2015) • 999 projects on ZhongChou (Bi, Liu, and Usman 2017) • 334 projects on Kickstater (Chan and Parhankangas 2017) • 131 projects on Kickstarter (Chan et al., 2017) • 669 projects on Kickstarter (Colombo, Franzoni, and Rossi-Lamastra 2015) • 267,295 projects on Kickstarter (Courtney, Dutta, and Li 2017) • 421 projects on Kickstarter (Frydrych et al. 2014) • 14,704 projects on Kickstarter (Kuppuswamy and Bayus 2015) • 25,072 projects on Kickstarter (Marom and Sade 2013) • 48,526 projects on Kickstarter (Mollick 2014) • 400,000 loans on Kiva (Moss, Neubaum, and Meyskens 2015) • 170 backers on Demohour projects (Xu et al. 2016) • 8529 projects on Kickstarter (Xu et al. 2014) • 49,693 loan listings on Prosper (Zhang and Liu 2012)
Product category effect	• There exist systematic variations in funding activities across product categories (Mollick 2014; Hörisch 2015).	• 583 projects on Indiegogo (Hörisch 2015) • 48,526 projects on Kickstarter (Mollick 2014)
Entrepreneur effect	• Human capital and social capital lead to funding success (Ahlers et al. 2015; Butticè, Colombo, and Wright 2017; Colombo, Franzoni, and Rossi-Lamastra 2015; Courtney, Dutta, and Li 2017; Mollick 2014; Skirnevskiy and Brettel 2017). • Male entrepreneurs tend to request and raise more funding than their female counterparts, whereas female entrepreneurs have higher funding success rates than their male counterparts (Marom, Robb, and Sade 2014; Greenberg and Mollick 2015). • Entrepreneurs who started nonprofit organizations seem to be more successful than those started with other organizational forms (Belleflamme, Lambert, and Schwienbacher 2013).	• 104 equity crowdfunding offerings on Australian Small Scale Offerings Board (Ahlers et al. 2015) • 31,389 projects on Kickstarter (Butticè, Colombo, and Wright 2017) • 669 projects on Kickstarter (Colombo, Franzoni, and Rossi-Lamastra 2015) • 267,295 projects on Kickstarter (Courtney, Dutta, and Li 2017) • 1250 projects on Kickstarter (Greenberg and Mollick 2015) • 20,769 projects on Kickstarter (Marom, Robb, and Sade 2014) • 48,526 projects on Kickstarter (Mollick 2014) • 19,351 projects on Kickstarter (Skirnevskiy and Brettel 2017) • 44 individual crowdfunding practices relate to practices in which entrepreneurs do not make use of a "structured" crowdfunding (Belleflamme, Lambert, and Schwienbacher 2013)
Location effect	• Local investors, such as family and friends, invest early and are less responsive to the behavior of other backers (Agrawal et al., 2015; Lin and Viswanathan 2016). • Location and its culture and altruism are related to product categories and crowdfunding success (e.g., Mollick 2014; Giudici, Guerini, and Rossi-Lamastra 2018; Josefy et al. 2017). • Projects that were closer to banks attracted less funding from local investors (Kim and Hann 2015).	• 34 successful artists on Sellaband (Agrawal et al., 2015) • 457 projects on 13 Italian reward-based platforms (Giudici, Guerini, and Rossi-Lamastra 2018) • 176 projects on Kickstarters/GoFundMe (Josefy et al. 2017) • 4358 listing on Prosper (Lin and Viswanathan 2016) • 62,163 projects on Kickstarter (Kim and Hann 2015) • 48,526 projects on Kickstarter (Mollick 2014)

2.2. Project effect

Project-level characteristics significantly influence crowdfunding outcomes. Due to limited proof of product or service concept, and limited information on the entrepreneur's background, many crowdfunding studies have focused on examining project-related characteristics influencing crowdfunding outcomes (e.g., Frydrych et al. 2014; Mollick 2014; Moss, Neubaum, and Meyskens 2015). For example, crowdfunding projects that include videos and had fewer spelling errors are more likely to be funded (Mollick 2014). Other project characteristics, such as word count, project name fluency, project novelty, and product quality, also influence the number of backers and their satisfaction (Bi, Liu, and Usman 2017; Chan, Park, and Patel 2018; Xu et al. 2016). Such an emphasis on the effect of project characteristics is not uniquely proposed in crowdfunding studies. Studies on entrepreneurial finance have long highlighted the importance of visible signals related to investment opportunity characteristics (e.g., Kirsch, Goldfarb, and Gera 2009; Shepherd 1999).

Consistent with the literature on observational learning, limited information could prompt herding in crowdfunding investments (Colombo, Franzoni, and Rossi-Lamastra 2015; Zhang and Liu 2012). Because crowdfunders cannot directly assess the quality of projects, they are likely to rely on funding patterns of other crowdfunders to make their own funding decisions (e.g., Zhang and Liu 2012). Prior funding activities would be viewed as informative because they reflect private interpretation of information by other funders regarding project quality. A project that has received a greater amount of funding may be perceived as having higher quality, encouraging subsequent funders to contribute to such project (e.g., Colombo, Franzoni, and Rossi-Lamastra 2015; Zhang and Liu 2012). Indeed, various types of crowdfunders, such as Prosper lenders, Sellaband investors, and Kickstarter backers, prefer to invest in well-funded loan listings, musicians, and projects (Agrawal et al. 2015; Colombo, Franzoni, and Rossi-Lamastra 2015; Kuppuswamy and Bayus 2015; Zhang and Liu 2012).

Furthermore, studies have considered the influence of project presentations on crowdfunding outcomes. For example, projects that are described as an opportunity to help others elicit more positive responses from lenders in the micro-lending context (Allison et al. 2015), whereas projects that frequently mention the entrepreneur's name or are frequently updated enjoy higher rates of success (Marom and Sade 2013; Mollick 2014; Xu et al. 2014). These findings suggest that the effect of project-level determinants will influence crowdfunding outcomes.

2.3. Product category effect

Most reward-based crowdfunding platforms require entrepreneurs to place their projects under a particular product category. Thus, projects are often nested within different product categories. These product categories are analogous to industry categories that entrepreneurs aim to compete in to raise funding. To draw an analogy, industrial organization economists have delineated how industry structure and corresponding determinants such as industry concentration could influence firm performance (e.g., Schmalensee 1985). Population ecologists also highlight the effects of environment on organizations (Hannan and Freeman 1977). Numerous studies have documented such consistent industry effects in shaping organizational performance (e.g., Fitza 2014; McGahan and Porter 1997; Schmalensee 1985; Short et al. 2007). Literature on venture capital (VC) has also documented the systematic tendency of venture capitalists (VCs) investing in certain industries (Gompers and Lerner 2004).

Similarly, each project category could exhibit different projects and distinct investment patterns and preferences. For example, projects in the technology product category would have more sophisticated investors and setting up such projects would require significant time and effort from an entrepreneur, whereas the costs of setting up for projects in the arts and entertainment product category may not be as high and the investors may not be as sophisticated.

Because projects within the same product category are likely to be influenced by the same industry-level determinants, such as market structure and consumer preferences (e.g., Fitza 2014; Schmalensee 1985; Short et al. 2007), product category-level determinants will likely influence crowdfunding success. Some product categories may be more popular and attract more backers and funding. For example, products in categories that typical consumers can provide more feedback on are better received (Ho-Dac, Carson, and Moore 2013). Although existing crowdfunding research has not examined what specific determinants within a product category could shape funding success, few have documented systematic variations of crowdfunding activities across different product categories (e.g., Mollick 2014; Hörisch 2015). Kickstarter provides statistics that indicate varying success rates of the projects across product categories, e.g., 50.70% in music or 60.57% in theater to 20.15% in technology.[1] These differences suggest that product category-specific determinants will shape crowdfunding outcomes.

2.4. Entrepreneur effect

According to strategy and entrepreneurship research (e.g., Chen and Miller 2012), a firm's characteristics, such as its resources and strategic actions, fundamentally shape its performance. Indeed, firm and industry debate research consistently found the effect of firm-level determinants greater than that of industry-level determinants (e.g., Karniouchina et al. 2013; Short et al. 2007, 2009).

In the nascent stage of firm formation, entrepreneurs serve as the precursor of firm characteristics. For example, when entrepreneurs adopt a dominant initial strategy for a new venture, that strategy is likely to persist in the long run (Boeker 1989). As entrepreneurship research highlights the interplay between entrepreneurs and opportunities (e.g., Shane and Venkataraman 2000), entrepreneurs' traits, experience, and skillsets influence the type of opportunities they identify and the amount of value that could be extracted from these opportunities (Marvel and Lumpkin 2007; Shane 2001; Zhao and Seibert 2006). Other studies have documented such entrepreneur effects by illustrating how serial entrepreneurs with successful track records would outperform others (Gompers et al. 2010; Parker). These studies suggest that entrepreneurs often play an important role in shaping crowdfunding outcomes where entrepreneurs with different characteristics would initiate different projects and extract different values even from the same set of opportunities.

Indeed, some studies have explored how entrepreneur-specific determinants could influence crowdfunding outcomes. Using signaling and social capital perspectives, prior studies find that entrepreneurs with greater human and social capital are more likely to attract early backers and capital, resulting in greater crowdfunding success (Ahlers et al. 2015; Colombo, Franzoni, and Rossi-Lamastra 2015; Courtney, Dutta, and Li 2017). These effects are particularly salient for serial entrepreneurs (Butticè, Colombo, and Wright 2017; Colombo, Franzoni, and Rossi-Lamastra 2015; Skirnevskiy and Brettel 2017). Likewise, entrepreneurs with more friends on online social networks are also more likely to

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[1] https://www.kickstarter.com/help/stats?ref=hello.

initiate successful projects (Mollick 2014). In addition, there are significant gender effects on crowdfunding strategies and success. Although male entrepreneurs have requested higher project funding and raised more funds than their female counterparts, female entrepreneurs have higher success rates in funding their projects (Ahlers et al. 2015; Greenberg and Mollick 2015; Marom, Robb, and Sade 2014). Finally, the organizational forms chosen by entrepreneurs could also affect crowdfunding outcome (cf. Belleflamme, Lambert, and Schwienbacher 2013). Overall, characteristics specific to entrepreneurs will influence crowdfunding outcomes.

2.5. Location effect

The firm and industry debate research has often overlooked the effect of geographical location. Yet, the location of a project may also be an important factor influencing crowdfunding outcomes. According to economic geography research, location often plays an important role in shaping firm performance. Prior studies have highlighted significant effects of location advantages because regional networks prompt information flows (Stuart and Sorenson 2003), enabling successful spillover effects of startup success and industrial clustering (e.g., Owen-Smith and Powell 2004; Stuart and Sorenson 2003). In addition, other studies in finance have documented a similar phenomenon, notably home bias, illustrating investors' tendency to invest in locally headquartered firms (e.g., Coval and Moskowitz 1999). Thus, entrepreneurs may benefit from these location advantages as they could use their network in a particular location to access important resources to develop and support their business ideas. For example, a movie project located in Hollywood, California may be construed as more viable in meeting future resource needs compared with a similar project from a small town not known for movie-making.

Although crowdfunding platforms may attenuate geography-related effects, a number of studies still document strong and persistent presence of location effects (Agrawal et al. 2015; Kim and Hann 2015; Mollick 2014). For example, projects are not evenly distributed across geographical regions and there are different product category clusters in different locations (Mollick 2014). These location determinants could result in location advantages shaping project success. For example, local investors, including family and friends, tend to fund projects earlier in the crowdfunding cycle (Agrawal et al. 2015). Projects that were closer to banks attracted less funding from local investors (Kim and Hann 2015), whereas those located where there are more creative population enjoy a higher rate of success (Mollick 2014). Location effects also take shape through local altruism (Giudici, Guerini, and Rossi-Lamastra 2018) or by promoting projects that shares similar values with local communities (Josefy et al. 2017). These findings suggest entrepreneurs do benefit from these location advantages in developing and supporting their business ideas. Therefore, location is therefore an important factor influencing crowdfunding outcomes.

2.6. Relative importance

These four levels of effects can be further categorized into two overarching categories, namely agency factors and structural factors. Agency factors refer to the determinants that are under the control of individual entrepreneurs and related to the entrepreneur and the projects that the entrepreneur started. In contrast, structural factors refer to determinants at a higher, collective level that are often manifested and emerge from the environment and generally cannot be controlled by individual entrepreneurs. These determinants are related to product category and geographic location.

At this nascent stage of firm formation where only business ideas are available, we suggest that the effect of agency factors will be greater than that of structural factors. Because agency factors are proximal and immediately related to the variance of project quality, they are more likely to directly shape crowdfunding outcomes. For example, project-level characteristics often signal project quality and are what crowdfunders attend to and utilize for making funding decisions. Consequently, these characteristics have been used by the majority of crowdfunding researchers as the primary antecedents of crowdfunding outcomes (e.g., Allison et al. 2015; Bi, Liu, and Usman 2017; Mollick 2014; Moss, Neubaum, and Meyskens 2015).

Similarly, entrepreneur-level characteristics also play a vital and immediate role at the nascent stage of firm formation. Entrepreneurship research often emphasizes the individual-opportunity nexus and highlights how entrepreneurs with different education or work experiences may recognize dissimilar opportunities (e.g., Marvel and Lumpkin 2007; Shane and Venkataraman 2000). Studies assert that a single technology innovation often results in multiple opportunities recognized by different entrepreneurs due to their different knowledge bases (e.g., Shane 2001). The resource-based view also highlights that entrepreneurs differ in the resources they possessed and such difference would determine their likelihood of successfully developing their ventures (Alvarez and Busenitz 2001). Studies on the effects of personality traits and entrepreneurial experiences on new venture performance further validate the dominant role that agency factors play in influencing crowdfunding outcomes (e.g., Butticè, Colombo, and Wright 2017; Skirnevskiy and Brettel 2017; Zhao and Seibert 2006).

In comparison, structural factors, consisting of location- and product category-level determinants, are likely to play less important role as these crowdfunding projects are often at the nascent stage of firm formation. Unlike mature firms that are subject to considerable routines and inertia (Baker and Nelson; Short et al. 2009; Van De Ven 1986), new ventures are less likely to be limited by these constraints as they are free to create processes and structures of their projects (Rosenbusch, Brinckmann, and Bausch 2011). They are also free to determine which market segment to focus and will often choose to operate in niche markets to overcome existing barriers to entry and diminish industry effect (Porter 1980; Short et al. 2009). Further, entrepreneurs are also less constrained by regional effects as crowdfunding platforms enable these entrepreneurs to reach out for investors residing in other regions. As long as their products are innovative and value creating, these entrepreneurs are able to attract crowdfunders from various locations to finance their projects (e.g., Chan and Parhankangas 2017; Moss, Neubaum, and Meyskens). Taken together, agency factors are likely play a more dominant role shaping crowdfunding outcomes compared with structural factors.

Hypothesis: Agency factors (project and entrepreneur) explain more variance in reward crowdfunding outcomes than structural factors (project category and location of the entrepreneur).

3. Method

3.1. Data and sample

In order to assess the relative effects of the four nested determinants influencing reward-based crowdfunding outcomes, we constructed our dataset using the Kickstarter platform because it is the largest reward-based crowdfunding platform in the USA and overwhelmingly dominates the crowdfunding marketplace. For example, by the end of 2017, Kickstarter backers had pledged almost $3.4 billion to crowdfunding projects, which is almost three times larger than the next largest competitor, Indiegogo. We focused on this US platform due to data availability.

Kickstarter uses a reward-based model allowing entrepreneurs to provide tangible but non-financial rewards for crowdfunding contributions. These rewards are often in the form of a token of appreciation, such as a thank-you note or pre-orders for the proposed product/service (Kuppuswamy and Bayus 2015; Mollick 2014). Entrepreneurs are asked to identify their location and classify their projects according to Kickstarter-defined product categories to help potential funders identify projects of their interests. Many Kickstarter projects have gone on to receive subsequent VC funding (Greenberg and Mollick 2015; Mollick 2014).

Based on this platform, we collated our dataset using the CrowdBerkeley database, created by the Fung Institute at the University of California, Berkeley (http://rosencrantz.berkeley.edu/crowdfunding/index.php). This database contains all Kickstarter projects that started from the beginning of the Kickstarter platform between May 2009 and May 2014. The full sample includes 105,555 projects. To rule out a possible multi-membership issue (Grady and Beretvas 2010), we followed prior studies (e.g., Short et al. 2007) and removed 7219 projects (6.84% of total projects) that were started by 2735 entrepreneurs (2.93% of all entrepreneurs), who have listed different locations for their multiple projects. The final sample includes 98,336 projects in 52 different Kickstarter-defined product categories that are initiated by 90,573 entrepreneurs from 8668 different locations (i.e., cities). On average, a project had 100 backers (s.d. = 877.98) and received $7587 (s.d. = 72,536.98), and 42.43% of these projects had reached their funding goals.

3.2. Analysis and variables

Kickstarter projects are nested in product categories, which are then nested in entrepreneurs, who are then nested in locations. We chose this nested structure due to the nature of crowdfunding projects. Entrepreneurs rarely change their residence as the majority of entrepreneurs have resided in one particular location. They could freely choose to launch projects in one or multiple product categories, and each project can only be placed in one product category as specified by Kickstarter. Such a nested structure represents the nascent stage of firm formation. At this stage, entrepreneurs may not have a clear idea on which industry to establish their new ventures and are free to test their business ideas in one or multiple product categories or industries. Such a structure also suggests that crowdfunding outcomes are likely to be correlated differently within these clusters.

We conducted a VDA to examine the relative contribution of various factors in determining an outcome variable. The VDA approach differs from the typical regression approaches. Unlike typical regressions that are used to measures the influence of predictors on an outcome variable, VDA only includes dummy indicators to capture relative variance explained by different levels of factors (McNamara, Deephouse, and Luce 2003; Rumelt 1991; Schmalensee 1985; Short et al. 2006). Using these dummy indicators, VDA teases out the relative effects of different levels of factors. Because of these unique features, VDA has been often applied in strategy and entrepreneurship research. For instance, strategy research has a long history of examining the relative importance of firm vis-à-vis industry effects in determining firm performance using VDA (e.g., McGahan and Porter 1997; Rumelt 1991; Schmalensee 1985). Similarly, VDA has recently been applied in entrepreneurship research to compare various entrepreneurial outcomes (e.g., Fitza, Matusik, and Mosakowski 2009; Short et al. 2009).

Specifically, we employed multilevel modeling as the technique of VDA (Rabe-Hesketh and Skrondal 2008). Multilevel modeling is one of the best practices that have been frequently advocated and applied by scholars to examine determinants of firm performance (e.g., Crossland and Hambrick 2011; McNamara, Deephouse, and Luce 2003; Quigley and Hambrick 2015; Short et al. 2006). It allows us to statistically account for potential interdependences across different partition variance–covariance components to model the multilevel nature of crowdfunding system and estimate level effects (Rabe-Hesketh and Skrondal 2008).

Following prior studies (e.g., Karniouchina et al. 2013; Short et al. 2009), we use the null models to identify the variances explained by determinants at different levels. These multilevel null models do not have any predictors (i.e., independent variables) per se and only include level indicators, i.e., project identifiers, product category identifiers, entrepreneur identifiers, and location identifiers. These unique identifiers represent shared membership within the same level and were then used to compare the relative importance of project, product category, entrepreneur, and location effects on crowdfunding outcomes (e.g., Karniouchina et al. 2013; Short et al. 2009; Rabe-Hesketh and Skrondal 2008).

Specifically, we used a four-level multilevel modeling with the unique project identifiers embedded in level 1, nested in product category identifiers in level 2, nested within entrepreneur identifiers in level 3, nested within location identifiers in level 4. This approach enables us to model the effects of project, product category, entrepreneur, and location on crowdfunding outcomes. Similar to prior studies using VDA (e.g., Karniouchina et al. 2013; Short et al. 2007), we do not report effect size or coefficients as the independent variables or predictors are not present in these null models. We only report the percentage of variance explained by each level of determinants and model fit metrics. The nature of using HLM for VDA allows researchers to account for 100% variance of the model. Likewise, following prior studies (e.g., Short et al. 2007, 2009), we illustrate what percentage of the entire set of variance is being explained by each level of determinants.

In our models, the lowest project-level effect (level 1) refers to unsystematic project-to-project variance in crowdfunding outcomes, which has also been referred to as error variance (Karniouchina et al. 2013). We used multilevel mixed-effect linear/logistic regression modeling (Stata 13 commands: xtmixed/xtmelogit) to calculate the corresponding intra-class correlation coefficients that describe the proportion of the total variance that depends upon nested memberships and allow us to assess the effects of the project, product category, entrepreneur, and location clusters on crowdfunding outcomes. For level-1 model, we estimated the following equation, representing the crowdfunding outcome of each project as a function of entrepreneur mean plus random error:

$Outcome_{ijkl} = \pi_{0jkl} + e_{ijkl}$

where $Outcome_{ijkl}$ represents the crowdfunding outcome of Kickstarter project i in product category j started by entrepreneur k from location l. π_{0jkl} is the mean crowdfunding outcomes in product category j of entrepreneur k from location l, while e_{ijkl} is a random project effect that reflects the deviation of project $ijkl$'s outcome from the product category mean.

For level 2, we examined mean crowdfunding outcomes in product category j of entrepreneur k from location l, π_{0jkl}, as it varies randomly around the mean entrepreneur effect with this formula: $\pi_{0jkl} = B_{00kl} + R_{0jkl}$. B_{00kl} is the mean of entrepreneur from location l, whereas is a random product category effect, representing the deviation of product category jkl's mean from the entrepreneur mean.

For level 3, we examined each B_{00kl}, mean crowdfunding outcomes of entrepreneur k from location l, as an outcome randomly varying around location mean with the following formula: $B_{00kl} = \gamma_{000l} + u_{00kl}$. γ_{000l} is the mean from location l, whereas u_{00kl} is a random entrepreneur effect, representing the deviation of entrepreneur kl's mean from the location mean.

For level 4, we examined each location mean, γ_{000l}, that varies randomly around a grand mean illustrated in the following formula: $\gamma_{000l} = \omega_{0000} + \tau_{000l}$. ω_{0000} is the grand mean and τ_{000l} is the random location effect, i.e., the deviation of location l's mean from the grand mean. This four-level model partitions the total variability in the crowdfunding outcome, $Outcome_{ijkl}$, into its four components and allows us to estimate the proportion of variation that lies within each level.

We used three crowdfunding outcome variables – *Pledge Amount, Number of Backers, and Funding Success* – to measure the success of project performance. *Pledge Amount* represents the total amount of funding a project received, *Number of Backers* indicates the number of crowdfunders pledged for that particular project, and *Funding Success* highlights whether a project has reached its funding goal or not. We chose these variables because they represent the most important performance dimensions shaping the outcome of these projects.

4. Results

Table 2 presents the results of the variance–component analysis. Taking the natural log of one plus the pledge amount as the dependent variable (Model 1), we find that 7.84% of the pledge amount variance can be attributed to the location effect, 50.88% of the pledge amount variance is due to the entrepreneur effect, 9.42% of the pledge amount variance is accounted by the product category effect, whereas 31.86% of the pledged amount can be attributed to the project effect. These results suggest that the entrepreneur effect is stronger than other effects by a significant margin.

Table 2. VDA results.

	Model 1 DV = ln (Pledge Amount)	Model 2 DV = Number of Backers	Model 3 DV = Funding Success
Location effect	7.84%	0.48%	8.67%
Entrepreneur effect	50.88%	66.26%	40.60%
Product category effect	9.42%	0.00%	0.36%
Project effect	31.86%	33.26%	50.37%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	98,336	98,336	98,336
Log likelihood	−240,437.55	−801,636.85	−64,897.01

Similarly, using the number of backers as the dependent variable (Model 2), we find that 0.48% of the variance can be attributed to the location effect, 66.26% to the entrepreneur effect, 0.00% to the product category effect, and 33.26% to the project effect. As is the case with the pledge amount, the entrepreneur effect is stronger than the other effects by a significant margin.

Finally, using funding success as the dependent variable (Model 3), we find that 8.67% of the funding success variance can be attributed to the location effect, 40.60% to the entrepreneur effect, 0.36% to the product category effect, and 50.37% to the project effect. Overall, these findings show that project,

product category, entrepreneur, and location effects do explain significant variances across three different crowdfunding outcome variables.

Our hypothesis states that agency factors explain more variance in reward crowdfunding outcomes than structural factors. Currently, HLM does not provide a statistical test to compare the variance explained by different factors. Following prior studies (Karniouchina et al. 2013; Short et al. 2007, 2009), we compared the amount of variance explained by different factors to reach our conclusions. Our findings across three different crowdfunding outcome variables suggest that the combined entrepreneur and project effects (82.74% to 98.52%) do appear to be substantially greater than the combined product category and location effects (1.48% to 17.26%). These illustrate that agency factors explain more variances than structural factors, supporting our hypothesis.

Upon a closer examination, we further note that the effects of structural factors (i.e., product category effects and location effects) do not consistently influence outcome variables. Product category effect on pledge amount is stronger than its effect on number of backers and funding success, which could be because different product categories likely have very different amount of requested funding. For example, entrepreneurs would request higher pledge amount for product rewards from the technology projects than from book projects. In contrast, product categories may not result in attracting more backers or leading to different funding success because backers could freely choose to fund projects in any product categories, making the projects in different product categories equally likely to be successful. On the other hand, location effect explains a larger amount of variance in pledge amount/funding success than in the number of backers is perhaps because crowdfunding platforms would reduce location effect on number of backers as entrepreneurs could raise funding from backers living in different locations. However, different locations do have different product category clusters (Mollick 2014), which may provide spillover effects of startup success (e.g., Owen-Smith and Powell 2004; Stuart and Sorenson 2003).

Furthermore, we found that the entrepreneur (akin to a firm) level effect is five times greater than the product category (akin to an industry) level effect at the nascent stage of firm formation. Interestingly, this ratio of entrepreneur-level effect to product category-level effect is comparable to the ratio of firm-level effect to industry-level effect established in prior findings for firms at the mature stage of new venture formation (Table 3).

Table 3. Industry effects versus firm effects.

	Our Study	Short et al. 2009	Short et al. 2009	Short et al. 2007	Karniouchina et al. 2013
Context	Business ideas	New ventures	Established firms	Established firms	Established firm
Industry effect (product category)	9.42	14.59	21.76	19.23	4.20%
Firm effect (entrepreneur)	50.88	41.31	63.22	65.82	15.50%
Ratio of firm/industry effects	5.40	2.83	2.91	3.42	3.69

4.1. Robustness tests

We performed a number of robustness tests to check for the consistency of these effect sizes.

Alternate project categories. Because the Kickstarter platform had changed its product categorizations at least once, these categories may not fully reflect the corresponding categories across years. Two co-authors of this paper independently re-classified Kickstarter product categories based on their knowledge of industry categorization. Their re-classifications were highly consistent and their differences were consolidated by another co-author, who assigned a final classification. Using these newly derived product categories, we conducted VDA and present these results in Models 4, 5, and 6 in Table 4.

Table 4. VDA results (correcting for changing product categorization scheme).

	Model 4 DV = ln (Pledge Amount)	Model 5 DV = Number of Backers	Model 6 DV = Funding Success
Location effect	7.84%	0.48%	8.67%
Entrepreneur effect	48.04%	66.26%	39.29%
Product category effect	10.72%	0.00%	2.27%
Project effect	33.40%	33.26%	49.77%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	98,336	98,336	98,336
Log likelihood	−240,455.4	−801,636.85	−64,896.64

Our original data also included entrepreneurs who only launched one project. However, we cannot tease out various levels of effects when there is a one-to-one, unique pairing between an entrepreneur and a project. Thus, we only included entrepreneurs who have listed only one location and started multiple projects for our analyses in Models 7, 8, and 9 in Table 5, and included serial entrepreneurs who started projects across multiple categories in Models 10, 11, and 12 in Table 6. Moreover, product categories may also vary in the degree of being entrepreneurial. We thus conducted another set of VDA using only technology-related categories, such as technology, hardware, and open software in Models 13, 14, and 15 in Table 7. The results are generally consistent with our earlier findings.

Table 5. VDA results (serial entrepreneurs).

	Model 7 DV = ln (Pledge Amount)	Model 8 DV = Number of Backers	Model 9 DV = Funding Success
Location effect	3.98%	14.09%	4.09%
Entrepreneur effect	55.22%	68.73%	44.12%
Product category effect	9.72%	0.00%	0.00%
Project effect	31.08%	17.18%	51.79%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	13,918	13,918	13,918
Log likelihood	−32,601.48	−114,781.51	−8892.32

Table 6. VDA results (serial entrepreneurs started projects in multiple product categories).

	Model 10 DV = ln (Pledge Amount)	Model 11 DV = Number of Backers	Model 12 DV = Funding Success
Location effect	5.50%	0.82%	7.37%
Entrepreneur effect	55.07%	65.51%	47.05%
Product category effect	8.35%	0.00%	7.68%
Project effect	31.08%	33.67%	37.90%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	6,104	6,104	6,104
Log likelihood	−14,532.79	−45,144.5	−3,789.25

Table 7. VDA results (technology categories).

	Model 13 DV = ln (Pledge Amount)	Model 14 DV = Number of Backers	Model 15 DV = Funding Success
Location effect	11.29%	0.38%	2.82%
Entrepreneur effect	64.89%	69.70%	49.58%
Product category effect	2.10%	0.00%	4.25%
Project effect	21.72%	29.92%	43.35%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	9,992	9,992	9,992
Log likelihood	−23,912.10	−90,779.00	−63,288.754

Inferences from the Indiegogo platform data. Finally, to further test the generalizability of our findings, we collected additional data from a different crowdfunding platform, namely Indiegogo, another leading crowdfunding platform considered second only to Kickstarter. It is similar to Kickstarter in utilizing a reward-based crowdfunding, but it differs in its flexible funding option. This feature allows an entrepreneur to access to the financial capital pledged by backers on the website, regardless of whether or not the project goal is reached.

Specifically, we targeted one specific category – "technology" – and collect all US-based projects in that category on Indiegogo's website that started from April 2010 through September 2013 and ran a set of VDA in Models 16 and 17 in Table 8. Using similar selection criteria, we also selected similar projects on Kickstarter to run the same set of VDA in Models 18 and 19 in Table 8. Although the amount of variance explained by the various levels of determinants differs slightly across subsets of population, we found that the effect sizes of entrepreneur and project to be overwhelmingly stronger compared to those of product category and location effects. These findings are consistent with our earlier results.

Table 8. VDA results using Indiegogo and Kickstarter datasets.

	Indiegogo (technology category)		Kickstarter (technology category)	
	Model 16 DV = ln (Pledge Amount)	Model 17 DV = Number of Backers	Model 18 DV = ln (Pledge Amount)	Model 19 DV = Number of Backers
Location effect	1.59%	0.00%	3.84%	5.66%
Entrepreneur Effect	68.95%	82.52%	66.37%	92.47%
Project effect	29.46%	17.48%	29.79%	1.87%
Total variance explained	100%	100%	100%	100%
Number of projects	932	932	1242	1242
Log Likelihood	−1,963.33	−7,979.24	−3,048.73	−10,372.73

4.2. Post hoc tests

We also conducted post hoc tests to propose potential future research directions.

Split-sample test. It is possible that different funding goals may influence the relative effects of these determinants. Using split samples with the median funding target ($5000) as a selection criterion, we found that our general conclusion remains consistent (Tables 9 and 10). That is, entrepreneur and project effects predominantly explain greater variance of crowdfunding outcomes.

Table 9. VDA results (funding target > $5000).

	Model 20 DV = In (Pledge Amount)	Model 21 DV = Number of Backers	Model 22 DV = Funding Success
Location effect	8.59%	0.62%	10.01%
Entrepreneur effect	57.99%	58.88%	51.65%
Product category effect	8.95%	0.00%	2.75%
Project effect	24.47%	40.5%	35.59%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	45,127	45,127	45,127
Log likelihood	−114,049.98	−385,498.18	−26,942.134

Table 10. VDA results (funding target = < $5000).

	Model 23 DV = In (Pledge Amount)	Model 24 DV = Number of Backers	Model 25 DV = Funding Success
Location effect	6.54%	0.72%	7.65%
Entrepreneur effect	41.89%	13.69%	37.44%
Product category effect	9.25%	28.32%	0.00%
Project effect	42.32%	57.27%	54.91%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	53,209	53,209	53,209
Log likelihood	−125,289.64	−326,284.91	−35,863.89

Cluster-level effects. It is also possible that the technology cluster of a particular location could enhance crowdfunding success of technology projects initiated from that particular location. We thus identify four subgroups based on the degree of technology cluster of project locations and the technology-related product categories. The degree of technology cluster of corresponding project locations is defined based on State Technology and Science (STS) Index developed at the Milken Institute (http://statetechandscience.org/statetech.taf?page=overall-ranking). Projects that were started in the top ten states – Massachusetts, Colorado, Maryland, California, Washington, Connecticut, Minnesota, Utah, Virginia, and Delaware – with the highest 2016 STS scores are considered to be located in Technology State, whereas other projects are considered to be located in Non-Technology State. Following prior studies (e.g., Chan and Parhankangas 2017), we considered projects in these Kickstarter product categories, i.e., "games," "hardware," "open software," "technology," and "video games," to be in the Technology Categories, whereas other projects are considered to be in Non-Technology Categories. These characteristics enabled us to identify four subgroups of the Kickstarter campaign population. We then conducted VDA for each subgroup and found the results to be fairly consistent with our previous results (Tables 11, 12, 13, and 14). However, we observe that location effect has a stronger influence on the amount of pledge for technology firms operating in a technology state and on funding success for non-technology firms operating in a non-technology state.

Table 11. VDA results (technology state, tech category).

	Model 26 DV = ln (Pledge Amount)	Model 27 DV = Number of Backers	Model 28 DV = Funding Success
Location effect	31.94%	0.01%	0.12%
Entrepreneur effect	41.55%	65.01%	50.55%
Product category effect	0.00%	0.00%	0.00%
Project effect	26.51%	34.98%	49.33%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	2933	2933	2933
Log likelihood	−7127.69	−27,933.75	−1,862.27

Table 12. VDA results (non-technology state, tech category).

	Model 29 DV = ln (Pledge Amount)	Model 30 DV = Number of Backers	Model 31 DV = Funding Success
Location effect	6.41%	3.63%	3.77%
Entrepreneur effect	55.00%	77.51%	42.99%
Product category effect	19.17%	3.66%	9.15%
Project effect	19.42%	15.20%	44.09%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	6151	6151	6151
Log likelihood	−14,930.55	−27,933.75	−3,752.43

Table 13. VDA results (technology state, non-technology category).

	Model 32 DV = ln (Pledge Amount)	Model 33 DV = Number of Backers	Model 34 DV = Funding Success
Location effect	7.13%	0.14%	7.65%
Entrepreneur effect	51.54%	88.74%	37.72%
Product category effect	4.19%	0.00%	0.00%
Project effect	37.14%	11.12%	54.63%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	28,776	28,776	28,776
Log likelihood	−70,247.10	−232,409.97	−19,337.64

Table 14. VDA results (non-technology state, non-technology category).

	Model 35 DV = ln (Pledge Amount)	Model 36 DV = Number of Backers	Model 37 DV = Funding Success
Location effect	8.44%	0.24%	18.80%
Entrepreneur effect	50.13%	75.57%	33.05%
Product category effect	8.15%	0.00%	0.00%
Project effect	33.28%	24.19%	48.15%
Total variance explained	100.00%	100.00%	100.00%
Number of projects	60,476	60,476	60,476
Log likelihood	−147,736.97	−432,788.44	−40,906.12

5. Discussion

Drawing on systems theory and using a comprehensive dataset from the Kickstarter and Indiegogo platforms, we categorized various determinants of crowdfunding outcomes and estimated their relative importance. We found that agency factors (entrepreneur and project effects) dominate to explain crowdfunding outcomes compared to structural factors (location and product category effects).

5.1. Contributions and practical implications

First, this study extends the debate of industry and firm effects on firm performance in strategy and entrepreneurship research (e.g., Short et al. 2007, 2009) to the nascent stage funding. Decades of studies in strategic management illustrate that firm-specific determinants, vis-a-vis industry-specific ones, consistently play a more important role in shaping firm performance outcomes (McGahan and Porter 2002; Short et al. 2007, 2009). Our study extends this line of research by examining the nascent stage of firm formation – success in raising funds. Similar to prior studies on relative firm vis-a-vis industry debate, our findings suggest that the effect of agency (related to the entrepreneur and the projects started by the same entrepreneur) is greater than the effect of structural factors (related to product category and geographic location). Such a result highlights the importance of entrepreneurs and their identified opportunities in the resource acquisition phase during the nascent stage of firm formation, echoing the individual-opportunity paradigm of entrepreneurship research (e.g., Shane and Venkataraman 2000). Indeed, our results are consistent with the resource-based view that highlights the importance of individual-specific resources that enable entrepreneurs to acquire resources for their ventures (Alvarez and Busenitz 2001).

Second, our study further contributes to the firm versus industry debate by adding and estimating relative effects of the entrepreneur's location into the mix. Although prior studies on firm vis-à-vis industry effects did not include location-level determinants, a location effect is well established in strategy and entrepreneurship literature (e.g., Stuart and Sorenson 2003) and also recently documented by crowdfunding studies (e.g., Giudici, Guerini, and Rossi-Lamastra; Josefy et al. 2017; Lin and Viswanathan 2016). Indeed, our study indicates that location effects account for a significant amount of variance in crowdfunding outcome. Such location effects may be more influential for large, mature ventures as these are more likely to be limited by considerable routines and inertia (Baker and Nelson 2005; Short et al. 2009; Van De Ven 1986).

Third, this study contributes to crowdfunding research. Our study is, to the best of our knowledge, the first to provide an overarching framework to organize and understand the effects of a myriad of determinants shaping crowdfunding outcomes. By juxtaposing the relative importance of project, product category, entrepreneur, and location effects on crowdfunding success, our study suggests potential directions for future crowdfunding research.

The predominant entrepreneur and project effects over location and product category effects suggest that future research efforts could focus on these two more salient areas in explaining crowdfunding success. These findings also suggest that crowdfunding context indeed removes some constraints around product category choice and geographical locations that many traditional entrepreneurs often face during fundraising. Although prior studies have documented consistent location effects (Agrawal et al.; Mollick 2014), our results suggest that location explains a relatively small percentage of the variance in the pledge amount (7.84%), the number of backers (0.48%), or funding success (8.67%). Despite their small magnitudes, location effects are still significant and may play a significant role as documented in the VC

literature (e.g., Stuart and Sorenson 2003). Future research may wish to continue exploring how location-specific determinants, such as urban/metro aspects, entrepreneur location, and funder location, influence crowdfunding outcomes. Furthermore, as prior studies have only documented systematic variations of funding success across different product categories (Hörisch 2015; Mollick 2014), researchers could further examine how product category determinants lead to varying funding outcomes.

Entrepreneurs can use our findings to understand determinants affecting crowdfunding outcomes, leading to a more effective crowdfunding effort. Entrepreneurs could assess the relative effect of their efforts on funding success and use the information to improve their likelihood of obtaining crowdfunding. For example, entrepreneurs seeking crowdfunding could focus on agency rather than structural factors.

5.2. Limitations and future research directions

In addition to previously mentioned direction for crowdfunding studies, our study's limitations provide future research opportunities. First, although we found that entrepreneur and project effects play dominant roles in influencing crowdfunding outcomes, the mechanisms behind these effects likely involve richer details that are yet to be explored. Although recent studies have examined the effects of some project- and entrepreneur-specific determinants (e.g., Allison et al.; Mollick 2014; Moss, Neubaum, and Meyskens 2015), additional determinants appearing to be less relevant to project quality, such as visual and phonetic cues (e.g., Chan and Park 2015), could also affect funding success and should be closely examined. Furthermore, there may be cross-level interactions of location-, entrepreneur-, product category-, and project-specific determinants in shaping crowdfunding outcomes. Future studies could further investigate these interaction effects as well as other alternative outcome variables. For example, how individual backers imitate the behavior of other backers, constituting herding (Colombo, Franzoni, and Rossi-Lamastra 2015; Zhang and Liu 2012), is an important phenomenon that may be influenced by different levels of determinants.

Second, we would like to highlight that the VDA methodology and our data have a few limitations. VDA did not allow us to test for potential interaction effects of determinants across different levels. Specifically, the "orthogonality" in VDA assumes that the upper level subsumes both fixed and random variance of lower levels. Yet, it is likely that such cross-level interaction effects exist and should be closely examined in the future. Further, the four levels of determinants that we identified in our data may be further expanded. Although these levels of determinants are based on prior literature and broader themes in crowdfunding context, it is possible that additional level(s) may exist. For example, crowdfunders may represent another important level of determinants. As more studies highlight the important role of crowdfunders (Chan and Parhankangas 2017; Colombo, Franzoni, and Rossi-Lamastra 2015; Zhang and Liu 2012), scholars may wish to compare the effect of crowdfunder-level determinants with other levels of determinants.

Third, we relied on the Kickstarter platform to juxtapose various effects, but it is unclear whether we would find similar findings with other platforms. Although we augmented our dataset with a relatively small sample from the Indiegogo platform to conduct robustness checks and found consistent results, different rules across various crowdfunding platforms are likely to alter the magnitudes of the effects identified in our results as funders' motives and behavior may change accordingly (e.g., Cholakova and Clarysse 2015). Similarly, because equity crowdfunding is severely limited in the USA, our results from the Kickstarter and Indiegogo platforms are based on reward-based platforms. It is possible that the dynamics in an equity-based platforms may be substantially different from those in reward-based platforms. Moreover, our findings may not generalize to other types of crowdfunding projects or to other

countries. Future studies may wish to explore further and examine the relative importance of various effects across different types of platforms and across different countries.

In addition to overcoming these limitations, crowdfunding research offers many interesting questions that could be addressed in the future. For instance, given the relatively small amount of funding raised by individual crowdfunding projects, crowdfunding may have been used to raise seed funding for startups. However, it is not clear whether crowdfunding is complementary or substitutive to large-scale, more professional funders such as angel investors or VCs. Moreover, it is possible that the types of projects requiring crowdfunding may be different from those that require professional investors. For instance, crowdfunding may be more appropriate for small-scale business-to-consumer (B2C) startups, whereas VC or private equity may be more appropriate for large-scale, capital-intensive projects. Future research may consider this possibility. Furthermore, our research focused on the dynamics in the US market. Future studies using datasets from different institutional and legal environments may lead to a richer understanding of different dynamics and offer novel insights.

The dynamics of crowdfunding are changing rapidly as new regulations are introduced and new platforms enter the market. We hope that our initial analyses can help researchers, practitioners, and regulators understand the dynamics of the nascent crowdfunding phenomenon.

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Disclosure statement

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