Essays on Crowdfunding:
Information Asymmetry, Signaling and Feedback

By

Christopher Michael Courtney
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Dr. Yong Li (Chair)

Dr. Supradeep Dutta

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“Groups are only smart when there is a balance between the information that everyone in the group shares and the information that each of the members of the group holds privately. It’s the combination of all those pieces of independent information, some of them right, some of the wrong, that keeps the group wise.”

— James Surowiecki, The Wisdom of Crowds

CHAPTER 1: INTRODUCTION

New ventures often seek external financing to bring their product or service to market. In recent years, crowdfunding has emerged as a new form of financing where entrepreneurs can fund their initiatives by drawing on relatively small contributions from a large number of individuals (the “crowd”) using the internet. While crowdfunding has gained momentum as an alternative source of financing, it presents unique challenges for both startups and individuals in the crowd due to the information asymmetry between entrepreneurs and the crowd. This dissertation explores how the start-up and the crowd of backers resolve information asymmetry to achieve crowdfunding success. First, I explore how signals of startup actions and characteristics interact with third-party endorsements from the crowd to mitigate information asymmetry concerns about project quality and founder credibility for potential backers. Second, I investigate the role of feedback in the decision-making of new venture founders and potential customers.

The first essay recognizes that information asymmetry exists between the entrepreneur and the potential crowd of backers and draws on information economics to examine when signals and endorsements obtained from multiple information sources enhance or diminish one another’s effects. We propose that signals through start-up actions (use of media) and characteristics (crowdfunding experience) can mitigate information asymmetry concerns about project quality and founder credibility, enhancing the project’s likelihood of attaining funding. Further, we posit
that while start-up-originated signals offset each other’s effects, third-party endorsements (sentiment expressed in backer comments) validate and complement start-up-originated signals.

In the first essay, potential customers can learn from feedback in the form of backer comments in an attempt to overcome information asymmetry. In the second essay, we recognize that entrepreneurs also face uncertainty over the product-market fit when introducing new products to market. The same feedback presents an opportunity for entrepreneurs to learn and revise previous assumptions (Cyert & March, 1963). We thus seek to understand how feedback influences the decision-making of entrepreneurs and customers in crowdfunding. Building on the information search and processing literature, we posit that entrepreneurs and customers will respond differently to the same feedback because of their different roles and information needs. Specifically, since entrepreneurs are unlikely to disclose negative information, third party feedback often provides the only source of negative information. Therefore, we expect that customers will place greater weight on negative feedback in their purchase decision. In comparison, we expect entrepreneurs will find positive feedback more diagnostic in their decision-making as it likely provides better guidance. We further examine whether the feedback effects will be more salient in the absence of other information sources.
CHAPTER 2: INFORMATION ASYMMETRY: SIGNALING AND ENDORSEMENTS

Abstract

This essay draws on information economics to examine when signals and endorsements obtained from multiple information sources enhance or diminish one another’s effects. We propose that signals through startup actions (use of media) and characteristics (crowdfunding experience) can mitigate information asymmetry concerns about project quality and founder credibility, enhancing the project’s likelihood of attaining funding. Further, we posit that while startup-originated signals offset each other’s effects, third party endorsements (sentiment expressed in backer comments) validate and complement start-up-originated signals. Empirical analyses based on a comprehensive dataset of crowdfunding projects on the Kickstarter website during 2009-2015 confirm our predictions.

Keywords: Crowdfunding, Signaling, Endorsements, Media, Experience, Sentiment
2.1: INTRODUCTION

Entrepreneurial ventures usually are resource constrained and need to seek external financial support for survival and growth in the early phase of development (Amit, Glosten, & Muller, 1990; Casson, 1982; Evans & Leighton, 1989). The inherent opaqueness about startup opportunities makes it difficult to attract external financing (Li & Chi, 2013). In recent years, crowdfunding has emerged as a new form of financing. Entrepreneurs can now fund their initiatives by drawing on relatively small contributions from a large number of individuals (the “crowd”) using the internet as a platform (Belleflamme, Lambert, & Schwienbacher, 2014; Mollick, 2014). Many of the recent technological advancements like 3-D printers and electronic watches have been supported through crowdfunding (Jeffries, 2013). While crowdfunding has gained momentum as an alternative source of financing (Massolution, 2015), it presents unique challenges for startups: Because of the information asymmetry between entrepreneurs and potential backers, entrepreneurs need to disclose credible information that potential backers can use to evaluate the potential of crowdfunding projects (Ahlers, Cumming, Günther, & Schweizer, 2015; Mollick, 2014). This study examines the interplay of signaling factors and third party endorsements that might inform the crowd about the viability of a project and thereby impact the likelihood of the project obtaining the desired crowdfunding capital.

To alleviate the information gap, potential backers can ascertain startup characteristics and entrepreneurial actions that may signal the underlying quality of the startup. An established stream of research following signaling theory (A. M. Spence, 1973) has analyzed how signaler attributes and signaler actions influence the likelihood of obtaining financial resources and achieving successful exit through IPO and acquisition (e.g., Baum & Silverman, 2004; Hsu,
For instance, factors like patents (Hsu & Ziedonis, 2013), entrepreneur educational background, top management team characteristics (Baum & Silverman, 2004; Hsu, 2007), and board governance (Sanders & Boivie, 2004) have signaling benefits that increase startups’ likelihood of receiving external capital.

Third party endorsements can also help alleviate the information gap concerning startup opportunities (Stuart, Hoang, & Hybels, 1999). Prior research has shown that third party endorsements through inter-organizational relationships with prominent organizations such as venture capital firms can serve as a signal of quality (Gulati & Higgins, 2003), enhancing the ability of startups to attract human capital (Hellmann & Puri, 2002) and form alliances (Hsu, 2006) in the process of innovation and commercialization (Dutta & Folta, 2016; Kortum & Lerner, 2000). Also, third parties such as the business press, analysts, expert reviews, and consumer reports can act as information intermediaries (infomediaries) to convey as well as assess the information available about the startup and its products (Zuckerman, 1999). For instance, research has shown that endorsements in the form of online product reviews by early consumers contain information that helps other consumers to ascertain the product’s utility before making online purchasing decisions (Chen & Xie, 2005; Mudambi & Schuff, 2010).

Extant research investigating the challenges of information asymmetry has typically examined the direct impact of specific signaling factors in isolation, addressed the contingency effect of signals under different levels of information asymmetry or market conditions (e.g., Hsu & Ziedonis, 2013; Reuer, Tong, & Wu, 2012), or investigated the impact of third party endorsements in reducing the information gap (A. A. King, Lenox, & Terlaak, 2005). Yet multiple signals and third party endorsements often operate at the same time. For example, the prospect of a crowdfunding project can be communicated through startup characteristics (e.g.,
crowdfunding experience) and startup actions (e.g., use of media) as well as through third party endorsements (e.g., backer comments). Therefore, an important question arises as to whether and how these multiple factors interact to enhance or diminish each other’s value.

Recent research has started to examine how different signals might have varying effects in alleviating information asymmetry. For example, Pollock, Chen, Jackson, and Hambrick (2010) find that the marginal effects of signaling through firm characteristics (executives and board members’ reputation) on IPO valuations increase linearly whereas the marginal benefits of signaling from third party endorsements (VCs and underwriters) increase at a diminishing rate. Ozmel, Reuer, and Gulati (2013) argue that new ventures’ prominent position in alliance networks and new ventures’ affiliations with prominent VCs tend to convey redundant information and have diminishing signaling benefits on new ventures’ future alliance formation. Plummer, Allison, and Connelly (2015) suggest that new venture affiliations with venture development organizations such as Y Combinator validate the signaling value of firm attributes (founder managerial experience) and actions (introducing a new product and operating from commercial property) in new ventures’ efforts to seek external capital.

The current study builds on this stream of research on signal interactions. In particular, the Connelly, Certo, Ireland, and Reutzel (2011) review underscores the need to understand how different types of signals interact to reduce information asymmetry. We heed the call and investigate the interplay between two types of information sources: those originating from the startup and those originating from third parties. We extend current research by examining systematically how signals originating from the startup and endorsements originating from third parties interact to affect the likelihood of obtaining external capital. We posit that while startup-originated signals offset each other’s effects, third party endorsements complement startup-
originated signals. We advance and test our theoretical arguments in the context of crowdfunding – a platform plagued with high levels of information asymmetry (Ahlers et al., 2015).

This study offers several potential contributions to the literature. First, scholars have long recognized information related challenges in securing resources and proposed various remedial mechanisms to mitigate the information asymmetry problem (Amit et al., 1990; Dutta & Folta, 2015). We advance the theoretical understanding of how signals and third party endorsements interact to alleviate information asymmetry problem in securing external investment. While both mechanisms reduce the information gap, we explicate how the interaction between information obtained from two origins, signals originating from the startup and endorsements from third parties, can enhance or diminish the perception of firm quality. We propose that the use of media and founder crowdfunding experience, two signals originating from the startup, convey similar information about the quality of the project and the credibility of the founder and thus diminish each other’s signaling benefits. Meanwhile, positive backer sentiments as a third party endorsement validate and complement the information conveyed through the use of media and founder crowdfunding experience, thereby enhancing the signaling benefits of media and founder experience.

Second, prior research investigating third party endorsement has largely focused on affiliations with prominent organizations like VCs (Gulati & Higgins, 2003) or alliances with established multinationals (Ozmel et al., 2013; Stuart et al., 1999). Recent research in marketing has started to examine the endorsement effect of consumer reviews and reports on online sales (Zhu & Zhang, 2010). Prior studies tend to measure third party endorsements as a dichotomous variable. We complement this stream of work both theoretically and empirically by examining the endorsement effect of a heterogeneous group of individuals commenting on a crowdfunding
project. In so doing, we operationalize a continuous measure of third party endorsement and suggest that information revealed through the collective evaluation of individuals in the crowd is valuable (e.g., Mollick & Nanda, 2015) and has a profound impact on reducing information challenges for early stage startups.

Third, extant signaling studies generally examine the influence of signals in the context of private equity investments (Hsu, 2006) or initial public offering (Reuer et al., 2012). The burgeoning crowdfunding literature has so far focused on the importance of individual signals in isolation, such as textual description of the project (Marom & Sade, 2013), use of video (Mollick, 2014), and founders’ educational background (Ahlers et al., 2015). Our study extends this stream of research by presenting an initial analysis of how multiple signals originating from different sources interact in the crowdfunding context.

Finally, our study introduces a novel sentiment analysis approach to entrepreneurship research. We employ a computer based algorithm called “SentiStrength” (Pang & Lee, 2008) to analyze the underlying tone of the textual comments posted by backers. This approach allows us to measure the strength of positive and negative sentiments in backer comments and examine their impact on crowdfunding success. We believe that sentiment analysis has strong potential for management research to capture critical information covered in textual documents like legal contracts, IPO prospectuses, and SEC filings.

### 2.2: BACKGROUND

#### 2.2.1: Information asymmetry, signaling, and third party endorsement

Information asymmetry between two parties can lead to inefficient exchanges and potentially result in market failure (Akerlof, 1970b). In the context of entrepreneurial financing, external investors and backers usually possess incomplete and imperfect information about the
prospect of the startup as compared with the entrepreneur. As a result, investors and backers face the economic risk of investing in a lemon (Akerlof, 1970b) and entrepreneurs face the challenge of credibly informing potential investors and backers about the potential of the startup. One solution suggested by signaling theory is that the informed party (e.g., entrepreneurs) can send observable signals to the less informed party (e.g., investors and backers) and disclose information about unobservable characteristics to promote exchange (A. M. Spence, 1973). For a signal to be effective, it needs to be credible, which often results from the signal being costly to imitate or the signal originating from a third party (Fischer & Reuber, 2007) that bears the cost of signaling (Sanders & Boivie, 2004).

Studies have offered insights into how signals reveal information to potential investors about the prospects of startups (Baum & Silverman, 2004; Hsu, 2007). For instance, patents filed by technology startups can act as a credible signal of the underlying quality of the innovation (Hsu & Ziedonis, 2013) and attract attention from private equity investors like VCs and angels (Baum & Silverman, 2004; Hsu & Ziedonis, 2013; Lerner, 1994; Mann & Sager, 2007).

Another related solution is that third party affiliations offer endorsements to the startup. Such endorsements may qualify as a signal of quality when the third party endorsing the startup or the product is a prominent entity (Stuart et al., 1999). For example, the ISO quality certifications, FDA drug approvals, and bond ratings can be considered as a signal of the underlying quality of an entity or its assets (A. A. King et al., 2005). Some third party endorsements may not be construed as credible signals when the third parties are not prominent entities. Nevertheless, such endorsements can be valuable in revealing discrete information about the assets of the company or the unique features of a product. For example, industry analyst
reports on the capital market or online product reviews by consumers help in reducing the search costs for potential investors and customers (Healy & Palepu, 2001; Mudambi & Schuff, 2010).

2.2.2: Information asymmetry in crowdfunding

Aside from private equity investments and initial public offering events that have been the focus of information economics research in management and entrepreneurship (e.g., Hsu, 2006; Reuer et al., 2012), recent studies have started to examine information challenges in crowdfunding. As of now, the most prominent and the fastest growing form of crowdfunding is rewards-based crowdfunding (Mollick, 2014). It involves the introduction of new products and services, which are often not yet on the market in finished form, in environments in which uncertainty and information asymmetry are prevalent (Belleflamme et al., 2014).

A typical reward-based crowdfunding project webpage describes the project in the form of text, images and videos, and contains information about the funding goal, the active duration of time for crowdfunding campaign (i.e., fundraising), comments left by the crowd of backers, updates left by the founder, number of backers and the amount of pledge (financial contribution). The project is typically active for a short duration of 30-60 days and is considered a success if it is able to reach the funding goal within the specified time period (Mollick, 2014). The reward typically includes pre-order of products or services (Gerber, Hui, & Kuo, 2012; Steinberg, 2012) that will be delivered to the backers at an earlier date, with better price, or with some other special benefit.

Crowdfunding presents unique information challenges (Ahlers et al., 2015; Mollick, 2014). Soliciting funding takes place within the bounds of the online interface and in a short time window. Further, crowdfunding projects often are at the early stages of development (Belleflamme et al., 2014) and uncertainty about the viability of the project is prevalent.
Information asymmetry concerns are critical when one party lacks information about the quality of another party or when one party is concerned about another party’s behavioral tendency (Stiglitz, 2000). In crowdfunding, the founder may know more about the underlying quality of the project than potential backers and the backers can be informationally disadvantaged with regard to the founder’s credibility to produce and deliver the product or service as promised (Ahlers et al., 2015; Gerber et al., 2012; Mollick, 2014). The quality of the project depends ultimately on the technical feasibility and market viability of the project’s product or service. As such, it is largely unobservable until the backer receives and experiences the product or service, but it can be reflected, among other things, through the physical attributes of the product, product functionality and the development stage of the project. The credibility of the founder concerns the trust that potential backers place in the founder’s promise to produce and deliver a product or service as specified. In our context, quality is more related to the functional aspects of the product or service and credibility more to the behavioral tendency of the founder.

We draw on the tenets of information economics and propose that these information concerns about project quality and founder credibility can be assuaged through signals and third party endorsements. Conceptually, we focus on two sources of information: signals originating from the startup and information obtained through third party endorsements. Signals from the startup typically include the firm’s actions and characteristics (Plummer et al., 2015) and third party endorsements include individuals or organizations affiliated with the startup that influence the perceptions of the firms’ quality. In the crowdfunding context, media usage is an important action undertaken by the startup that helps to convey what the project is about, at what stage the project is, the outcome of the project, and what need it fulfills. The founders’ crowdfunding
experience is an essential characteristic that informs about the founder’s ability and experience in developing a project and realizing a successful outcome. One unique source of third party endorsement in the crowdfunding context is the sentiment reflected in the comments of backers that may help reduce the information asymmetry between the startup and potential backers. In the following sections, we elaborate on why these can be viewed as valuable information mechanisms and how they interact to influence the likelihood of crowdfunding success.

2.3: RESEARCH HYPOTHESES

2.3.1: Signals originating from the startup

Use of media. Since crowdfunding projects are typically in the nascent stage of development, entrepreneurial actions that demonstrate project quality and founder credibility can help attract backers and increase crowdfunding success. One potential action that startups can undertake is to use media such as video and images to communicate the attributes of the product and the stage of development. Information conveyed through media indicates the product’s technical feasibility and the project’s market readiness that help potential backers to ascertain the project quality. Since projects that are able to include both video and images are likely at a more developed stage and have met at least minimum preparation for crowdfunding (Mollick, 2014), the likelihood of the founder developing and delivering the product with the specified functionality in the particular time frame will also be higher, which enhances potential backers’ trust in the founder’s ability to live up to the promise. Thus, use of media can demonstrate preparedness and signal project quality and founder credibility.

Low quality projects can imitate the video and images of high quality projects, but not without costs. Although the monetary expenses in making a video or creating an image can be marginal, especially with advancement of information technologies (e.g., the use of a
smartphone), the real cost incurred to demonstrate project preparedness pertains to the founder’s ability and efforts to lead the project to the development stage that enables a high quality project to use appropriate media tools to display a working model, prototype or beta versions of the product. To the extent that the initial efforts to get the project ready for demonstration in video or image are significant, the costs of using media will likely be differentially higher for low quality projects. Such differential costs can deter imitation by low quality projects, although they may not eliminate imitation and fraud, a point we revisit later. It is thus reasonable to expect that it is economically more beneficial for high quality projects to use media tools to signal project quality and founder credibility than for low quality projects that have not incurred the costs to develop a quality product. To the extent that crowdfunding projects differ in their use of media, such differences can convey useful information to backers on variation in the startups’ underlying quality and the founder’s credibility to successfully develop and deliver the product. We therefore hypothesize:

**Hypothesis 1 (H1): Use of media in crowdfunding projects has a positive effect on the likelihood of achieving crowdfunding success.**

**Founders’ crowdfunding experience.** Unique characteristics or resources that startups possess can also act as potent signals of project quality and founder credibility. Because information about young startups is usually lacking, potential backers rely on the observable characteristics of a startup to assess its prospects (Shane & Cable, 2002). One important attribute that draws attention from external investors and facilitates access to financing is a startup’s human capital (Beckman, Burton, & O’Reilly, 2007; Gompers, Kovner, Lerner, & Scharfstein, 2008). In particular, founder and founding teams’ experience can influence investors’ funding decisions (Burton, Sørensen, & Beckman, 2002; Hsu, 2007; Kaplan & Strömberg, 2004).
Founders differ in their crowdfunding experience. Some have more experience in successfully raising crowdfunding capital than others. Such experience can be a credible signal of project quality and founder credibility. Potential backers can draw meaningful inferences from founders’ past success about the quality of the current project. In addition, if a founder has experience in launching and managing crowdfunding projects successfully, it makes the founder’s promise to develop and deliver the current project more credible.

It is difficult for founders with no past success to misrepresent their record or mislead potential backers. Crowdfunding platforms like Kickstarter maintain records of founders’ past projects. Such records are observable to potential backers and cannot be manipulated. To the extent that founders’ past success correlates with the quality of the current project and reflects the founder’s credibility, successful crowdfunding experience can be useful in distinguishing high quality projects from low quality projects. Hence we expect:

*Hypothesis 2 (H2): Founder’s past success has a positive effect on the likelihood of achieving crowdfunding success.*

2.3.2: Endorsements originating from third parties

*Backer sentiments.* Apart from signals originating from the startup, information revealed through third party endorsements can also help backers ascertain project quality and founder credibility. Potential backers usually have little information about early-stage startups and entrepreneurs may have incentives to misrepresent or inflate the information, e.g., regarding the startup’s intellectual capital, market viability, or other resources, in order to seek investment (Akerlof, 1970b; Ravenscraft & Scherer, 1987). Such opportunistic behavior imposes further challenges on evaluating the startup’s potential. Third party endorsements such as venture capital backing and affiliation with prominent organizations can signal startup’s quality and help resource holders ascertain the value of a firm (Gulati & Higgins, 2003; Hsu, 2004; Plummer et
al., 2015; Podolny, 1993, 1994; Stuart et al., 1999). Some endorsements from informed third parties (infomediaries), e.g., product reviews by online consumers and publishers, may contain information about the product features and functions that helps potential buyers to make purchasing decisions (Chen & Xie, 2005; Zhu & Zhang, 2010).

The crowdfunding context presents a unique source of third party endorsement through a collective set of backer comments. It is common for backers to leave comments about a project on the crowdfunding platform. Information conveyed through backer comments can help other potential backers when they invest their time and capital in startups that usually experience considerable uncertainty in their embryonic stage. The perceptions and opinions of backers can be considered as peer generated evaluations that influence the perceptions and opinions of others (Rindova, Petkova, & Kotha, 2007). When the sentiment reflected in the backer comments is overall positive, it acts as an external endorsement of the project quality and the founder’s credibility.

First, since project backers are potential early customers of the product, backer comments can contain information about the technical feasibility and market viability of the product – a mechanism akin to revealing information through customer reviews in online transactions. In this regard, backer comments can inform about certain features unique to the product or even provide suggestions to improve the design and usability of the product. Here is an example:

“...I am only a "backer" of this project, so I am neither entitled nor in a position to give you definite answers. But maybe I can help with some thoughts. Bluetooth: Personally I wouldn't consider this as an option for transferring ALL the data to the HUB. It may work for single sensors to transfer data to a collecting HUB (on the body), so that you could get around those nasty cables (I own a perception mocap suit and can tell you that the cables ARE an issue). But with roughly around 128kB of data transfer on a "perfect" BT 2.1 connection you just don't have enough bandwidth. Just a thought. I'd like to see sensor-to-hub BT...”
A more positive sentiment reflected in the collective sum of information provided in the comments indicates a greater expectation about the worthiness of the project and helps other potential backers to evaluate the quality of the project or validate their own assessment before their decision to back the project.

Second, backer comments may also carry information about the founders’ credibility to develop and deliver the product as promised that further instills trust in backing the project. For example, a backer commented:

“I backed their last Solar panel. Not only did they deliver on time, the product was great and I use it almost everyday...”

We expect the overall positive sentiment reflected in the backer comments to serve as a viable third party endorsement of project quality and founder credibility for the following reasons. First of all, potential backers tend to attend to comments when making or revising their funding decisions.\(^1\) Our interviews with three backers and two project founders as well as a pilot survey of 36 backers of a single project in the games category, conducted in December 2015, also confirm that potential backers observe the comments before making or revising a pledge. Here is an example from the Kickstarter platform:

“I'm going to drop my pledge on Wednesday if they don't respond to any of the questions raised by backers below regarding validity & integrity of the project.”

Second, it is not easy, albeit not impossible, for a founder to deliberately obtain biased comments from multiple backers to such a degree that they would alter the overall sentiment in the backer comments. Our sample, which is essentially the population of crowdfunding projects on the Kickstarter platform, shows that projects with comments on average receive 51 backer comments during the funding period. Unlike many online

\(^1\) Evidence based on google analytics posted by project founders (see, e.g., http://i.imgur.com/XVVeE56.png) suggests that those who spend longer time visiting a project website (more than 10 seconds) usually click two to three links, including those to the “comments” and “updates” sections of the project webpage.
consumer reviews that can be submitted by the public, comments on a crowdfunding platform are usually restricted to the backers who have made the pledge. A comment, once left, becomes a permanent record and cannot be altered or hidden by any party. Moreover, backers, unlike equity investors, only make a soft pledge that can be changed or withdrawn before the end of the crowdfunding campaign. The pledge will only be committed or “locked in” when the project reaches the funding goal by the end of the crowdfunding campaign. Such a design does not encourage backers to post biased comments during a crowdfunding campaign.

It is worth noting that the information in each comment reflects an individual’s idiosyncratic assessment that may or may not resonate with others’ and the information may even be irrelevant to others’ decision and increase the noise. This is because backers usually are a heterogeneous group of individuals with varying tastes, experiences, and perceptions. However, the overall sentiment echoed in the comments from multiple backers can increase the neutrality and reliability of the information and help potential backers to make a more informed decision. In particular, an overall positive sentiment in the cumulative set of backer comments indicates a higher willingness of the community as a whole to support the product.

We thus propose that the positive sentiment reflected in backer comments can assuage the information concerns related to project quality and founder credibility and increase the likelihood of attaining the crowdfunding goal. Formally:

*Hypothesis 3 (H3): The intensity of positive sentiment in backer comments increases the likelihood of achieving crowdfunding success.*
2.3.3: Interplay of signals and third party endorsement

Signals in the form of media and founder crowdfunding experience can operate at the same time with third party endorsements through backer sentiments. It is thus important to investigate how they interact to influence the likelihood of crowdfunding success.

Interaction between signals originating from the startup. Although some differences exist in the information interpreted through observing media (a signaler action) and founders’ past success (a signaler characteristic), the two signals originate from the same source. Both media (Hypothesis 1) and successful crowdfunding experience (Hypothesis 2) convey information about project quality and founder credibility that may offset each other’s informational value.

The signaling value of media usage in determining crowdfunding success is a function of the level of the potential backers’ information concerns with regard to both quality and credibility. If the founder does not have prior crowdfunding success, potential backers confront greater uncertainty regarding the potential of the startup and the value of capital commitment. As a result, they will have to rely more on media usage and other channels of information. Hence the signaling value of media usage will be higher. If, on the other hand, the founder has prior success in achieving crowdfunding goals, potential backers will have more trust in the unobservable quality of the project and the founder’s promise to deliver. As a result, the marginal value of media usage as a signal will be relatively lower. This line of reasoning suggests:

Hypothesis 4a (H4a): The positive effect of use of media on likelihood of achieving crowdfunding success decreases with the founder’s past crowdfunding success.

Interactions between startup signals and third party endorsement. While the signals originating from the startup (use of media and founder crowdfunding experience) may reduce
each other’s effects, third party endorsements can validate and complement the information conveyed by the signaler. First, sentiments underlying backers’ comments are external to the startup. While information conveyed through media usage and founder crowdfunding experience can be observed at the very start of the project, backer comments are observed subsequently in the crowdfunding process after some individuals have pledged financial contributions. Since backers are cognizant of different startup signals before making comments on a project, an overall positive backer sentiment helps validate the information signaled through the use of media and founders’ crowdfunding experience. At the same time, anticipation of negative backer comments can to some extent deter some founders from falsifying or misconstruing the use of media.

Equally important, the information conveyed through backer comments can complement the information obtained from the startup. In addition to the textual description of the project and the information available through different startup signals, backers can source information through other channels such as internet search and social networks. Drawing from various information sources, backers make a judgment about the quality and credibility of the project and form their perceptions. In this regard, the underlying sentiment reflected in backer comments is an outcome of information sourced from various origins and can complement the information from startup actions (use of media) and characteristics (founder crowdfunding experience), provided that the information is consistent across different channels and in the same direction. Because backer sentiment and startup signals originate from different sources, they are two distinct information mechanisms and are thus less likely to reflect redundant information or offset each other’s effects. We thus expect that information reflected in a positive backer
sentiment strengthens the signaling benefits of media usage and founder crowdfunding experience. Therefore, we predict:

*Hypothesis 4b (H4b): The positive effect of media usage on the likelihood of achieving crowdfunding success increases with the intensity of positive backer sentiment.*

*Hypothesis 4c (H4c): The positive effect of founder’s past success on the likelihood of achieving crowdfunding success increases with the intensity of positive backer sentiment.*

### 2.4: DATA AND METHODS

#### 2.4.1: Sample Construction and Data Sources

To test our hypotheses, we extract the universe of crowdfunding projects started on Kickstarter from its inception on April 21, 2009 to December 27, 2015. Kickstarter is the largest and most dominant rewards-based crowdfunding platform and has been widely used in prior crowdfunding research (e.g., Kuppuswamy & Bayus, 2014; Mollick, 2014). Our dataset contains 267,295 projects founded by 237,443 founders with 8,763,837 comments posted by backers. Of all the projects, 98,546 (36.87%) are successful in reaching the funding goal and have raised a cumulative total of over $1.86 billion USD, which is consistent with Kickstarter’s self-reported success rate of 36.47%. To the best of our knowledge, our dataset is the largest and most comprehensive that has been obtained from the Kickstarter platform so far.

For the analysis, we perform the following procedures to construct the sample (see also Mollick, 2014). We consider projects located inside the United States, raised in USD currency and with a crowdfunding goal of more than $1,000. This desired level of homogeneity allows us to control for cultural differences and geographic distance and eliminate projects with small financial goals indicating non-serious efforts to raise funds. We exclude projects that are canceled by the project founder before the funding round is scheduled to close (voiding all pledges), projects suspended by Kickstarter, projects that are still active at the time of data.
collection, and projects that are removed from the Kickstarter website. The final sample contains 170,248 projects created by 149,986 founders, of which 40.44% (68,847) are successful in reaching the funding goal.

2.4.2: Dependent Variable

The dependent variable, Success, is a dummy variable, equal to one if the project was able to reach the crowdfunding goal set by the project founder at the start of the project. This measure of crowdfunding success has been used in prior crowdfunding research (e.g., Mollick, 2014) and is an appropriate measure for projects on the Kickstarter platform that uses an “all or nothing” approach. Projects that reach their funding goal at the end of the crowdfunding campaign receive the money that backers pledge. Such projects are considered to have successfully raised crowdfunding capital. Projects that do not meet their funding goal at the end of the crowdfunding campaign do not receive any capital, and the backers are not charged with the pledge. Such projects are considered a crowdfunding failure.

2.4.3: Explanatory Variables

Media. We create an ordinal measure of media usage based on the richness of the media tool employed by the project. The variable Media is equal to zero if a project has no video and no image, one if it has only images, two if it has only a video, and three if it has both images and video. Usage of images and video enhances media richness in online communication (Lodhia, 2012; Sun & Cheng, 2007). Video is considered to have a higher level of richness than images and text, leading to enhanced trust by the recipients (Rockmann & Northcraft, 2008). Kickstarter

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2 The results remain similar to those presented in the paper when cancelled and suspended projects are included.
supports the idea of using video and images and urges project founders to use such visual media formats to provide a better description of the project.

**Past Success.** The variable *Past Success* is the natural logarithm of one plus the number of Kickstarter projects that the project founder has successfully crowdfunded before the start of the focal project. Kickstarter states that it “rarely permit[s] running multiple projects at the same time, or launching a second project before fulfilling your first one” ([https://www.kickstarter.com/help/faq/creator+questions](https://www.kickstarter.com/help/faq/creator+questions)). Accordingly, a project founder with past success has likely delivered the rewards to the backers in exchange for the capital pledged.

**Backer Sentiment.** We create a continuous variable that measures the overall sentiment reflected in the backer comments, positive and negative. Specifically, we first identify all the backer comments that each project has received over the crowdfunding duration. We exclude comments left by the project founder and comments that were left after the active crowdfunding campaign. This procedure ends up with 3,599,917 backer comments for our analysis.

Next, we run a sentiment analysis for each comment, using the tool SentiStrength to ascertain the positive and negative nature of the comment. SentiStrength classifies the text in each comment as positive on a scale of 1 (neutral) to 5 (strongly positive) and negative on a scale of -1 (neutral) to -5 (strongly negative). For illustration, a comment stating: “The lack of communication is worrisome. If silence persists, I'll drop this project.” has a negative sentiment score of -4. Another comment stating: “Wow love the new cover art on the campaign page.

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3 Sentiment analysis uses a computer-based algorithm to conduct analysis of written text or speech to extract the attitude of the author or speaker about specific identities or topics. SentiStrength has been used in research in computational social science, psychology, and management information systems (Ferrara & Yang, 2015; Stieglitz & Dang-Xuan, 2013; Thelwall, Buckley, & Paltoglou, 2010, 2011). It is useful to classify emotions in short informal messages in online platforms and has been shown to provide a higher accuracy rate than the standard machine learning approaches (Thelwall et al., 2010). For more information, see http://sentistrength.wlv.ac.uk.
Makes it very clear what it is and how it works.” has a positive score of 4. The measure Backer Sentiment is calculated for each comment and aggregated to the project level:

$$\text{Backer Sentiment} = \sum \text{Pos} / (\sum \text{Pos} + \sum \text{Neg})$$

where Pos is the SentiStrength positive sentiment score for each comment; Neg is the negative sentiment score for each comment and is reverse coded for calculation purposes.

**2.4.4: Control Variables**

We incorporate a number of project-level variables that may influence crowdfunding success. Project Goal is the log transformed measure of the funding goal set by the project founder. Duration is the logarithm of the number of days for which a project is open and accepts funding. Spelling Error is a dummy variable equal to one if a project had a spelling error in the project description. Spelling Error indicates reduced preparedness and quality and can reduce the likelihood of success (Mollick, 2014). We use the Oxford English Dictionary’s list of the top 100 most common misspellings (Staff, 2013) to determine which projects have these errors. Words is the log of the number of words in the project description. Longer descriptions take up more space on the screen, dominate a provider’s field of vision and may crowd out other stimuli (Haas, Dahlander, & George, 2015). Quick Updates is a dummy variable equal to one if the founder posted an update to the project within the first three days of the project start (Mollick, 2014). Prior studies have shown that the number of updates and rewards are positively related to crowdfunding success (Kuppuswamy & Bayus, 2014; Mollick, 2014). Rewards is the log of one plus the number of different rewards offered. FB Shares controls for social network aspects of the project and is the log of one plus the number of Facebook shares for each project. Crowd Comments is the log of one plus the number of comments left by backers during the active campaign.
At the founder level, we control for the potential impact of the founder’s social network on reaching the funding goal. We collect the number of Facebook friends for the founder from the founders’ bio. We generate a dummy $FB_{top50}$ if a founder’s number of Facebook friends is in the top 50th percentile, and a dummy $FB_{bottom50}$ if a founder’s number of Facebook friends is in the bottom half (Mollick, 2014). Founders with no Facebook account linked serve as the reference group.

Some projects provide additional text, images and videos through external web links. $URL_{Links}$ is the log of one plus the number of external URL web links in the project description. Geographic location can influence funding by angel investors and venture capital investors but its effect on crowdfunding is inconclusive (G. Burtch, Ghose, & Wattal, 2014). We include dummy variables for the top five states by number of projects - New York ($NY$), California ($CA$), Texas ($TX$), Florida ($FL$), and Illinois ($IL$).

We account for project category differences in crowdfunding success by including dummy variables for the following categories highlighted in Kickstarter: Art, Comics, Dance, Design, Fashion, Food, Film & Video, Games, Journalism, Music, Photography, Technology, Theater, Publishing, and Crafts. Finally, we include year dummies for the time when a project was launched to control for unobservable time-varying effects.

### 2.4.5: Estimation Models

Since our dependent variable, $Success$, is binary, we employ logit regressions to test our hypotheses. Hypotheses H1, H2, and H4a are tested with our full sample of 170,248 projects. Hypotheses H3, H4b, and H4c test the effects of Backer Sentiment with the 71,005 projects that have at least one comment. Restricting our analysis to only those projects with comments creates a possible selection bias, because projects that receive at least one comment may systematically...
differ from projects that do not have any comments. To account for this potential selection bias, we employ a two-stage Heckman procedure (Heckman, 1976). We estimate a first stage probit model to determine the likelihood of a project receiving at least one comment (the “selection” model). From this estimation, we derive an inverse Mills’ ratio that accounts for selection in the second stage logit analysis (the “outcome” model”).

For the first stage selection model, the sample included all the 170,218 projects. The dependent variable Comment is equal to one if a project had at least one comment, and zero otherwise. As independent variables, we included a series of characteristics that we expect to influence whether a project received a comment. Absent better exclusion criteria, we included two industry-level variables: Games and FilmVideo, which indicate whether a project is in the games category or in the film and video category, respectively. Projects in the games category, both successful and unsuccessful, are likely to receive comments because they tend to get the community talking about the game. Gaming communities across the US are an active crowd seeking to collaborate, support, and develop new gaming projects. On the other hand, projects under the film and video category draw attention from selective aficionados of a particular genre of film and video in which the project belongs, which lessens the broad crowd appeal. Therefore, projects in the film and video category may have a relatively lower prospect of receiving a comment. At the same time, we do not expect that being in the games or film and video category per se would be systematically related to the crowdfunding success of a project. Our practice is consistent with past research that has used industry or location dummy variables as the exclusion criteria (i.e., Baker & Gompers, 2003; Nahata, 2008). Games and FilmVideo are correlated with receiving a comment ($\rho = 0.11$ and $-0.05$, respectively; $p < 0.01$) but are not significantly correlated with crowdfunding success ($\rho = 0.002$ and 0.005, respectively; $p > 0.01$). These
preliminary tests increase our confidence in using the two category dummies as the exclusion criteria.

2.5: RESULTS

Table 1 presents the descriptive statistics and correlations. The correlations are generally small in magnitude and the variance inflation factors (VIF) are below 3, indicating that multicollinearity is not likely a concern. In addition, we standardized the independent variables \textit{Past Success} and \textit{Backer Sentiment}, by subtracting the mean and dividing by the standard deviation, to avoid high correlations between their interaction terms (Neter, Wasserman, & Kutner, 1990).

Table 2 reports the results for our hypotheses. We use robust standard errors. McFadden’s $R^2$ for our models are between 0.34 and 0.46, indicating a good model fit. We employed Wald tests to gauge the improvement in the explanatory power of the models. Table 2 shows that each of our main variables improves the model fit significantly at $p<0.05$. Model 1 is the baseline that only includes the control variables. Models 2-4 test H1, H2 and H4a about the effects of signals originating from the signaler (use of media and past success) and their interactions. Models 6-8 report results for H3, H4b, and H4c concerning the effects of backer sentiment as a third party endorsement and its interaction with signals from the signaler. Model 9 is the full model.

We gauge the economic effects of the variables and their interactions by calculating the average marginal effects (Hoetker, 2007). We use the STATA margins command to first
calculate the predicted value using the values of the variables for each observation and then average those predicted values. We graph the values in Figure 1 to aid in the interpretation of the interaction effects.

H1 predicts that use of media increases the likelihood of crowdfunding success. In Model 2, Media has a positive and statistically significant coefficient estimate ($\beta = 0.30, p < 0.01$), providing support for H1. The average likelihood of crowdfunding success is 32.91% when no media (i.e., no video or image) is included, and it changes to 43.67% when the project has both images and video, indicating a net increase of 10.76%.

H2 suggests that projects with founders that have more past crowdfunding success have a greater likelihood of reaching the crowdfunding goal. We find a positive and significant coefficient for Past Success in Model 3 ($\beta = 0.14, p < 0.01$), which supports the prediction. The average likelihood of crowdfunding success is 40.08% when a project founder has no successful crowdfunding experience, but the likelihood is 44.02% when the founder has one past success, indicating an increase of 3.94%, all else being equal.

H4a proposes that the positive effect of media usage on crowdfunding success decreases as the founder has more past success. The coefficient of the interaction term Past Success X Media in Model 4 is negative and significant ($\beta = -0.09, p < 0.01$), lending support to H4a. Figure 1a shows that the probability of success increases with the value of media (an ordinal measure). More important, when past success increases from zero to one, the increase in the probability is evidently larger for projects with no media than for projects with both video and images, which suggests an offsetting effect.
We now turn to the results for the effects of backer sentiment. The first stage probit model, Model 5 in Table 2, estimates the likelihood of receiving at least one comment. Important to our analysis, while projects in the game category have a higher likelihood of crowdfunding success ($\beta = 0.44$, $p < .01$), projects in the film category have a lower likelihood of crowdfunding success ($\beta = -0.26$, $p < 0.01$). Furthermore, the inverse Mills ratio, derived from Model 5, is statistically significant in Models 6-9 ($p<0.01$), indicating that there may indeed be some selection and supporting our use of the Heckman procedure.

H3 hypothesizes that a higher intensity of positive sentiment in backer comments increases the likelihood of crowdfunding success. In Model 6, Backer Sentiment has a positive and significant coefficient ($\beta = 0.27$, $p < 0.01$), consistent with H3. The results suggest that a two standard deviation increase from the mean in positive backer sentiment increases the likelihood of crowdfunding success by 6.95%.

H4b proposes that the positive effect of media usage on the likelihood of crowdfunding success increases with the level of positive backer sentiment. In Model 7, the interaction term Backer Sentiment X Media is positive and significant ($\beta = 0.06$, $p < 0.01$), offering support for H4b. In Figure 1b, when backer sentiment increases from the mean to two standard deviations above the mean, the increase in the probability of success is larger for projects with both video and images than for projects with no media, which suggests a strengthening effect of positive backer sentiment.

H4c posits that the positive effect of founder past success increases with the level of positive backer sentiment. As expected, the interaction term Backer Sentiment X Past Success has a positive and significant coefficient in Model 8 ($\beta = 0.04$, $p < 0.01$). In Figure 1c, when backer sentiment increases from the mean to two standard deviations above the mean, the
increase in the probability of success is not evidently larger for projects with founders having one prior success than for projects with founders having no past success, which suggests minimum interaction effects between backer sentiment and founder past success. Model 9 includes the main variables and their interactions in a single model. The results remain consistent.

2.6: ROBUSTNESS TESTS

We conduct a number of additional tests to ensure the robustness of our results. First, the quality of media can vary across projects. While it is difficult to gauge image quality for a large sample as ours, we generated an alternative measure of media that incorporates a few dimensions of video quality that we could capture from the Kickstarter platform. The new measure starts at zero and one is added for each of the following conditions that is true: the project has video, audio, image, higher quality audio (sample rate $\geq$44100 Hz), two channel audio, video which appears to have been edited (based on video and audio comparison), video created prior to project launch, and video in the suggested two to four minute length (as per Kickstarter community and employees). The final measure ranges from zero to eight. The results in Model 1 of Table 3 are consistent with those in Table 2, offering further support for the effects of media.

Second, prior success may be perceived differently for projects of different sizes or with different numbers of backers. We created two alternative measures for prior success, using the logged amount of raised funds or logged number of backers for prior successful crowdfunding projects. As shown in Models 2 and 3 of Table 3, both measures offer support for all our hypotheses.
Third, backer sentiment might be affected by (1) comments that come after the soft pledge amount reaches the funding goal, and (2) comments that come too late to be processed by the crowd and acted upon. To address this issue, we generated an alternative measure of backer sentiment based on the following comments. First, since Kickstarter does not reveal information on when the “soft pledge” total reaches the goal amount, we assume that funding occurs in a linear and constant rate and include only comments left before 90% of the goal amount was reached for successful projects. Suppose a project ran for 30 days and reached 200% of its funding goal. We assume that the project reaches a pledged amount equal to the goal in 15 days (100%/200% x Duration of project = 15 days) and considered only comments for the initial 13.5 days (90%/200% x Duration of project = 13.5 days). Second, for unsuccessful projects, we include all comments before the end of the crowdfunding campaign because by definition such projects have not reached the goal. Third, we always include the comments from the first three days, as comments from the early days can be particularly influential on other backs’ decisions for the rest of the crowdfunding campaign. The results for the new measure, as shown in Model 4 of Table 3, are fully consistent with those in Table 2, providing further support for our hypotheses on the effects of backer sentiment.

We perform several additional analyses. First, when we include the number of backers as a control, Backer Sentiment remains positive and significant, suggesting that backer comments provide distinct information, above and beyond the sheer number of backers. We do not include the number of backers in other models due in part to concerns of multicollinearity and endogeneity. Second, the signaling effects of media, past success, and backer sentiment may be more prominent in categories characterized by greater information concerns. We divide the projects into two broad category types (Marom & Sade, 2013): Tech projects include the
technology, design and games categories, and *Artistic projects* include the remaining categories. Our analysis, available upon request, indicates that the coefficient for *Backer Sentiment* is significantly higher for tech projects than for artistic projects at $p < 0.01$, but that the coefficients of *Media* and *Past Success* are not statistically different across the two sub-samples. Second, given the imperfect nature of the exclusion criteria, we ran a “naïve” logit regression without controlling for having received a “comment.” The results in Model 5 of Table 3 are consistent with those in Models 6-9 of Table 2 for our hypotheses. Finally, since we collected data from the start of Kickstarter, it is possible that projects in the early days were significantly different from more recent projects. We excluded projects from 2009 and 2010 and found similar results.

### 2.7: DISCUSSION

Crowdfunding is fraught with information concerns (Ahlers et al., 2015; Mollick, 2014). Our study advances understanding of this phenomenon by exploring how multiple signals and third party endorsement interact to influence the likelihood of crowdfunding success. To do so, we draw on information economics and conceptually differentiate between two sources of information – those originating from the startup and those originating from third parties.

Our findings with a comprehensive dataset from Kickstarter underscore the impact of signaling and endorsement in securing funding in rewards-based crowdfunding. We argued that both startup originated signals (use of media and founders’ prior crowdfunding success) and third party endorsements (positive backer sentiments) mitigate information asymmetry concerns about project quality and founder credibility. We observed a positive effect of these information mechanisms on crowdfunding success. Further, our empirical analysis suggests that while the two startup-originated signals offset each other’s effect, third party endorsements complement and validate startup-originated signals.
2.7.1: Contributions

First, we advance the application of signaling theory by examining the interplay between multiple signals originating from the startup and third parties endorsements. We argue that signals originating from the same source, such as media usage and founder past success, offset each other’s signaling benefits. Specifically, media usage is more beneficial when project founders do not have prior crowdfunding success. This argument is similar to that about the offsetting relationship between patents and entrepreneurial experience as signals (Hsu & Ziedonis, 2013). In the crowdfunding context, many backers are less sophisticated than private equity investors, and backers tend to invest in smaller amounts. Therefore, information conveyed through media usage can be as valuable for backers as information conveyed through patents or other intellectual property signals.

Second, our study contributes to the nascent yet growing research stream investigating various information mechanisms to achieve crowdfunding success. The few crowdfunding studies that draw on signaling theory have offered insights into how information can be conveyed through the founders’ education background (e.g., Ahlers et al., 2015), textual description of the project (Marom & Sade, 2013) and use of video (e.g., Mollick, 2014). Our study extends this stream of work by presenting an initial analysis on how multiple signaling factors and endorsements interact to influence a project’s likelihood of meeting the funding goal. In particular, we explored backer sentiment as a unique source of third party endorsement in the crowdfunding context. When multiple signaling channels provide a myriad of information, endorsements from third parties can play a pivotal role in validating or complementing the information provided by the startup.
Finally, our study has useful implications for entrepreneurs, individual backers, and policy makers who have recently started to focus on this form of entrepreneurial financing with the JOBS act in effect. Entrepreneurs and potential backers in the crowd face substantial information challenges about the prospects of crowdfunding projects. Our study not only points to backer sentiment as a new source of information but also explores the interaction of backer sentiment with signals originating from the startup.

2.7.2: Limitations and future research

We discuss several limitations of our study and suggest a few areas for future research.\textsuperscript{4} We explored the signaling value of media use, but we focused only on the richness of different media formats and, in our robustness tests, we considered some quality aspects of video (e.g., sample rate of audio and length of video in each video clip). Large sample studies such as ours pose difficulty in operationalizing more fine-grained measures that may further differentiate project quality. Our measure of media as a signal is a reasonable but imperfect proxy. We thus call for future research that examines more proximate measures of media quality. For example, future research can offer further insight by conducting a content analysis of media and assessing its quality. In addition, media can be used to misrepresent the quality of the project and mislead potential backers. Given the extra costs needed to have credible signals, false media signaling may not become a systemic problem, or it will lose its signaling value. Recent research suggests that the number of fraudulent cases is small in crowdfunding as of now and that video as a signal is credible in the sense that projects with videos are more likely to deliver the promised reward (Mollick, 2015). Nevertheless, as the crowdfunding market grows and the use of media gains

\textsuperscript{4} We owe much of our discussion in this section to the insights from three anonymous reviewers.
popularity, it is worthwhile to study the antecedents and consequences of false signaling and fraud in crowdfunding.

We took the first step to examine the endorsement effects of backer comments. There are multiple research opportunities about backers and backer comments. First, given our focus on interactions between signals and endorsements, we examined the impact of backer sentiment as one construct. It is worthwhile to investigate how positive and negative sentiments may separately influence crowdfunding behavior and outcomes. Second, backer comments can potentially reduce conflicting interpretations of signals. Since online transactions are susceptible to fraudulent activities, sentiments conveyed through backer comments may help other backers as well as administrators of crowdfunding platforms to ascertain the worthiness of a project and reduce chances of falling prey to fraud.

Since our empirical analysis is based on a large sample, it is important to gauge the marginal effects of the signals and third party endorsements (Lin, Lucas Jr, & Shmueli, 2013). We have shown that the change in the likelihood of a project successfully receiving funding is moderate to substantial as a result of media usage (10.76%), prior crowdfunding success (3.94%), and positive backer sentiment (6.95%). The moderating effect of backer sentiment on the impact of media usage, based on point estimates, is as expected (5.11%) but its moderating effect on past success, despite the statistical significance, is much less than we expected (0.73%). One possible explanation is that backer sentiment can complement and validate the information conveyed through media. However, past success does not require validation except that it can be made aware to potential backers that are otherwise unaware of the founder’s record. Thus the main contribution of backer sentiment is likely the additional information that complements the information conveyed by past success. Future research can offer more insights by comparing the
validation and complementarity effects of third party endorsements. Lastly, apart from sentiment of backers, other backer characteristics may be important for crowdfunding success. For example, backers that are geographically closer to the project founder may have more or better information about the founder. “Power backers”, those that are experienced, active and fairly known to the crowdfunding community, may have a differentially greater impact on other backers.

Factors that have signaling effects may also have learning benefits (A. M. Spence, 2002), which points to a potential alternative explanation for the effects of signals that we observed. In particular, founders can learn from crowdfunding experience, including from past success and failure that may enable them to develop better projects. Our study is unable to separate learning benefits from the signaling effects. Learning has a direct benefit to the firm without being observable to outsiders (e.g., lowering costs to produce the same output) while the signaling effect of past success only has value if observed. Future research along these lines can make significant contributions to signaling and learning theories.

Finally, our study focused on rewards-based crowdfunding for conceptual clarity, practical importance, and data availability. A comparison of this model with other models, including donation-, loan- and equity-based crowdfunding can shed new light on crowdfunding strategy and performance.

2.8: CONCLUSION

Crowdfunding presents unique information challenges. This study extends current research by addressing the influence of multiple signals and third party endorsement on crowdfunding success. In this process, we seek to advance the application of information
economics by examining when signals and third party endorsements interact to enhance or diminish one another’s effects and exploring backer sentiment as a unique source of third party endorsement. We hope this study stimulates further theory development and empirical analysis in the areas of signaling and crowdfunding.
### Table 2.1: Correlation matrix and descriptive statistics

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**Note:** Correlations with an absolute value greater than 0.1 are significant at the 10% level (Bonferroni corrected).
**Notes:** Robust standard errors appear in parentheses. Models 1-4 and 6-9 are Logit regressions. DV is success, equal to one if project reaches funding goal. Model 5 is the first stage probit, and DV is Comment, equal to one if project has at least one comment. Wald Chi2 tests are significant at p<0.01
## Table 2-3: Predictors of Project Success: Robustness Tests

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<td>-0.04+</td>
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<td>(0.02)</td>
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<td>Past Success(^b) X Media(^a)</td>
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<td>0.03**</td>
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\(^{**}\) p<0.01, \(^{*}\) p<0.05, \(^{+}\) p<0.1

Notes: Robust standard errors appear in parentheses. Models 1-4 report the second stage Heckman logit (1st stage not shown). Model 5 is the logit estimation without control for selection bias. DV is Success, equal to one if project reaches funding goal. \(^a\) Media in Model 1 is based on analysis of project video quality. \(^b\) Alternative measures of past success: ln(prior funds raised) in Model 2 and ln(prior number of backers) in Model 3. \(^c\) An alternative measure of Backer Sentiment in Model 4. Wald Chi2 tests are significant at p<0.01
Figure 2-1: Average Marginal Effects with Interaction Terms

Notes: The plots are based on the estimations in Models 4, 7 and 8 of Table 2, with media and standardized measures of past success and backer sentiment (log transformed). The values for the x-axis in Figure 1c are actual values of past success for ease of interpretation, but the graph is based on standardized measures of the log transformed variable.
CHAPTER 3: WISDOM OF THE CROWD: HOW DOES FEEDBACK AFFECT DECISION-MAKING OF CUSTOMERS AND ENTREPRENEURS?

Abstract

Research Summary. This essay explores differences in the decision-making processes of entrepreneurs and customers. From an information search and processing perspective, we posit that entrepreneurs and customers will respond differently to the same feedback because of their different roles and information needs. Specifically, we expect that when customers make a purchasing decision, they will search for negative feedback more than positive feedback. Entrepreneurs are unlikely to disclose negative information themselves and feedback from third parties is often the only source of negative information. In comparison, we propose that entrepreneurs will find positive feedback more diagnostic in their decision-making. Under conditions of uncertainty, positive feedback will likely provide better guidance about what to do. Whereas negative feedback may only remove one or more options from consideration and is therefore often less helpful given a large number of available options. We further propose that the feedback effect will be more salient in the absence of other information sources.

Keywords: Information asymmetry, Feedback, Crowdfunding, Uncertainty, Signaling
3.1: INTRODUCTION

This essay explores the differences in the decision-making processes of entrepreneurs and customers. The behavioral theory of the firm assumes that organizations use feedback to learn and revise previous assumptions (Cyert & March, 1963). Yet, “Surprisingly, feedback processes have been little studied in entrepreneurship, although feedback is one of the most important facets of learning processes.” (Frese, 2007, p. 181). It has been suggested that one of the foremost characteristics distinguishing entrepreneurs from other groups relates to the entrepreneur's ability to identify and exploit market opportunities for the creation of business ventures in uncertain conditions (Casson, 1982; Knight, 1942). Because identifying and exploiting these market opportunities requires a customer, whose needs the entrepreneur attempts to satisfy, entrepreneurs often seek to learn from potential customers to evaluate opportunities. For instance, in an attempt to decrease uncertainty associated with new product development, the ‘lean start-up’ methodology introduces a continuous ‘Build, Measure, Learn feedback loop’ where entrepreneurs learn from customer feedback to test their business model assumptions starting with the most uncertain (Blank, 2013; Ries, 2011). However, the proponents of the lean start-up methodology have largely been silent as to how customer feedback is processed.

We address the research question: how does feedback affect the decision-making of customers and entrepreneurs? Customer feedback in the form of reviews, like those available on Amazon or Yelp, is widely available on the internet and helps guide the purchasing decision of customers by enabling them to learn from others. This type of feedback is often referred to as electronic word-of-mouth, defined as “any positive or negative statement made by potential, actual, or former customers about a product or company, which is made available to a multitude of people and institutions via the Internet” (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004,
It is widely known that customers often utilize customer feedback when weighing purchase decisions. For instance, BrightLocal found that in 2017, 93% of customers regularly or occasionally read online reviews and 85% of people said they trust online reviews as much as personal recommendations (Anderson, 2017). Customer feedback is believed to be more credible than marketing communications because it is less prone to bias (Banerjee, 1992; Bickart & Schindler, 2001; Bone, 1995; West & Broniarczyk, 1998). In an online environment, feedback provided by users typically becomes publicly available to anyone. One of the most interesting facets is that multiple parties can receive and process the same feedback. For instance, when an entrepreneur launches their product, feedback can provide valuable insights into product-market fit which may influence the perception of the opportunity’s value. For potential customers, feedback may provide clues as to the underlying quality of a product, service or the seller. Therefore, influencing the customer purchase decision.

The introduction of new products into the market is inherently fraught with uncertainty for entrepreneurs developing the products and for customers weighing product purchase decisions. Entrepreneurs often consume significant resources to bring new products to market while facing uncertainty regarding many facets such as product-market fit (Sivadas & Dwyer, 2000), technology (Folta, 1998), and costs (Dixit & Pindyck, 1994). For example, research has shown that up to 40-80% of new products fail (Castellion & Markham, 2013). Therefore, entrepreneurs wishing to commercialize their innovations are often interested in learning how to mitigate uncertainties associated with new product introduction and decreasing resource allocation (i.e., time, capital, and assets) toward products which ultimately fail. Accordingly, entrepreneurs often seek feedback to resolve uncertainty (Busenitz & Arthurs, 2007; Onyemah, Pesquera, & Ali, 2013).
Strategy scholars have placed a great deal of scholarly attention toward the decision-making process used by entrepreneurs (Busenitz & Barney, 1997; Forbes, 2005; Holcomb, Ireland, Holmes Jr, & Hitt, 2009; Simon, Houghton, & Aquino, 2000). For instance, scholars have attempted to explain the differences in decision-making that distinguish entrepreneurs from other groups of people such as managers in large organizations (Busenitz & Barney, 1997), bankers (Sarasvathy, Simon, & Lave, 1998), and non-entrepreneurs (Burmeister & Schade, 2007; Sandri, Schade, Musshoff, & Odening, 2010). Scholars have also examined the role of decision-making in funding entrepreneurial ventures with a focus on opportunity evaluation and investment decisions of venture capitalists (e.g., Cumming & Dai, 2010). While the marketing literature has added to our understanding of the customers’ decision process (e.g., Chevalier & Mayzlin, 2006). However, little work has specifically focused on the differences between the decision-making of entrepreneurs and customers.

We propose that the decision-making of entrepreneurs is different from those of customers because of the different roles they play and the different information need they face. Specifically, this study addresses how these differences influence the processing of feedback. Research in psychology and organizational behavior has shown that people respond differently to positive and negative stimuli (Matlin & Stang, 1978; Peeters & Czapinski, 1990; Rozin & Royzman, 2001; Skowronski & Carlston, 1989), but whether the response differs across groups remains an open question. Because of the different roles of entrepreneurs and customers, and because of their different information needs, we propose that entrepreneurs and customers will respond differently to the same feedback. Empirical analysis supports our predictions that while customers give greater weight to negative feedback when making decisions, entrepreneurs’ decisions are more influenced by positive feedback.
Customers and entrepreneurs often process multiple pieces of information before making decisions. Therefore, in addition to the customer feedback, the decision-making of entrepreneurs and customers also depends on the availability of other sources of information. However, since the search for information is costly, the decision to continue searching is guided by the perceived costs and expected benefits of additional search (Stigler, 1961). For these reasons, this study proposes and finds empirical support for the feedback effect being more salient absent other sources of information.

Many decision-making models focus on discrete, one-time decisions; however, many contexts elicit continuous and ongoing decision-making (Hastie, 2001). Therefore, our framework acknowledges that entrepreneurship is a dynamic process (Dimov, 2011; McMullen & Dimov, 2013) with an uncertain environment (Packard, Clark, & Klein, 2017) which involves information search and processing and allows for feedback. By adopting these realistic assumptions, we can explore how feedback influence the decisions of two separate groups and how the decision-making process changes when incorporating multiple sources of information.

When choosing a context to test our hypotheses empirically, it is important to find an environment where customers provide feedback which is available to both customers and entrepreneurs, and the decisions of both customers and entrepreneurs are observable and measurable. Also, the feedback should come at a time when it may be useful in decision-making for both parties. A review of the literature revealed that the majority of studies focused on online customer reviews made on e-commerce websites, review sites, and discussion forms while some others used data from social networking sites and even blogs (Cheung & Thadani, 2012). These studies used products and services already released and available in the market. However, for reasons such as path dependence, once a product is released altering course is more costly
(David, 2001). Since we are interested in evaluating the entrepreneur’s decision regarding the evaluations of opportunities where feedback is likely valuable, we use a unique context in which entrepreneurs have not finalized the product, crowdfunding. Akdeniz, Calantone, and Voorhees (2014, p. 742) also suggest that “with the increasing popularity of Internet reviews or customer-generated reviews, it would be interesting to… investigate how nonmarketing-controlled signals that are released prior to launch may effectively signal product quality.” We use data from the rewards-based crowdfunding platform, Kickstarter, which meets our criteria. This research context has several relevant benefits. First, rewards-based crowdfunding involves the introduction of new products and services, which are often not yet on the market in finished form, in environments in which information need is high (i.e., uncertainty and information asymmetry are prevalent) (Belleflamme et al., 2014; Courtney, Dutta, & Li, 2017). It provides a context in which both entrepreneurs and customers are involved in search for additional information. Second, while the literature has studied the effect of feedback for products already on the market where feedback is presumed to be sent (i.e., posted online) after the commenter has experienced the product; in crowdfunding, the feedback is often sent prior to experience of the product. This context allows us to determine how feedback influences opportunity evaluation at a time when the feedback is likely to be more valuable, the product development stage, and abandoning an opportunity or altering course is less costly.

This research contributes to the literature in a few ways. First, while some studies suggest that negative feedback has a larger impact on decision-making, other studies indicate that positive feedback has a larger impact on decision-making. We contribute to the literature by suggesting that the identity of the feedback receiving party is important to reconcile the differences in extant research. This is because different parties may have different information
needs and the focus of their search may vary. We find that customers place a greater weight on negative feedback while entrepreneurs pay greater attention to positive feedback. Second, our findings that feedback has a larger effect in the absence of other sources of information suggests that entrepreneurs can decrease the customer’s reliance on feedback, which is out of their control, by providing more information signals of firm quality which is in their control. Third, the literature on feedback has evolved along different streams. We integrate the marketing feedback literature which has focused mainly on the customer purchase decision with the entrepreneurship literature which has mainly focused on feedback during opportunity evaluation (Ardichvili, Cardozo, & Ray, 2003). The marketing literature has widely examined the effect of feedback on customers’ learning (Zhao, Yang, Narayan, & Zhao, 2013), purchasing behaviors and intentions (e.g., Jalilvand & Samiei, 2012), willingness to pay (Pavlou & Dimoka, 2006) and trust (e.g., Chang, Hsieh, & Tseng, 2013) while ignoring the role of that same feedback on the entrepreneurs opportunity evaluation decision (For a review see: Cheung & Thadani, 2012; R. A. King, Racherla, & Bush, 2014). To our knowledge, this study is the first to compare how entrepreneurs and customers process feedback differently in their decision-making. While the marketing literature on feedback has explored differences in receiver characteristics such as involvement or prior knowledge (Park & Kim, 2008), few studies have examined differences between distinct groups of receivers. Awad and Ragowsky (2008) provide one such exception where they find differences between men and women. The customer purchase decision and the entrepreneurial evaluation of opportunity are intertwined, and so examining these two decisions simultaneously provides a more complete picture of the value of customer feedback, the customer purchase decision and the entrepreneurial opportunity evaluation process. Fourth, research on crowdfunding has examined the determinants of crowdfunding success such as
entrepreneurial signals (Mollick, 2014), endorsements (Courtney et al., 2017), product innovativeness (Chan & Parhankangas, 2017), linguistic style (Parhankangas & Renko, 2017), the type of the rewards (Butticè, Colombo, & Wright, 2017; Colombo, Franzoni, & Rossi-Lamastra, 2015), and social capital (Mollick, 2014). According to Colombo et al. (2015), crowdfunding potentially means “more feedback, more debugging, and more opportunities to fine-tune a product” (p. 79). This is the first study to investigate such in this context. Even though a survey of entrepreneurs found that the most important motive for crowdfunding was to learn about demand (Mollick & Kuppuswamy, 2014), the overwhelming majority of crowdfunding research focuses on financing. We investigate the decision-making of both the entrepreneur and customer and how feedback from the crowd influences their decisions, moving crowdfunding research beyond financing. We suggest that crowdfunding provides early feedback which provides entrepreneurs with an opportunity to learn.

3.2: BACKGROUND

3.2.1: Crowdfunding Context

In this essay, we confine our analysis to rewards-based crowdfunding, which is different from other forms of crowdfunding (e.g., equity, loan, and donation-based). Rewards-based crowdfunding involves the introduction of new products and services, which are often not yet on the market in finished form, in environments in which uncertainty and information asymmetry are prevalent (Belleflamme et al., 2014; Courtney et al., 2017). We suggest that project founders who launch their projects via a crowdfunding platform such as Kickstarter, recognize, evaluate and act on an entrepreneurial opportunity. Although an agreed upon definition of the entrepreneur does not exist (Bull & Willard, 1993), project founders are believed to act as entrepreneurs in crowdfunding. Prior research has similarly viewed project founders as
entrepreneurs (Belleflamme et al., 2014; Gordon Burtch, Ghose, & Wattal, 2013; Davis, Hmieleski, Webb, & Coombs, 2017; Kraus, Richter, Brem, Cheng, & Chang, 2016; Mollick, 2014). Following Bygrave and Hofer (1992), we define an entrepreneur as someone who perceives an opportunity and creates a crowdfunding project to pursue it while facing uncertainty regarding the opportunity’s value. In doing so, we build on the Bygrave and Hofer (1992) definition of an entrepreneur as ‘someone who perceives an opportunity and creates an organization to pursue it’ while incorporating the nature of our context and incorporating uncertainty which has long been a hallmark of entrepreneurship (Knight, 1921). For instance, Hébert and Link (1989) trace the definition back to 1755 in Richard Cantillon’s work as “someone who exercises business judgment in the face of uncertainty.”

3.2.1.1: Information Search for Entrepreneur.

Entrepreneurs often commit significant resources to bring new products to market while facing uncertainty regarding the product-market fit (Sivadas & Dwyer, 2000). Entrepreneurs use their judgment to make decisions about what outcomes are feasible, which actions will lead to the desired outcome, and whether to move forward with a venture under conditions of uncertainty (Knight, 1921; Packard et al., 2017). The selection and use of distinct decision processes depend upon various internal and external factors, including the perceived nature of the decision itself and the uncertainty surrounding it (Packard et al., 2017). Before launching a crowdfunding project, an entrepreneur faces the greatest uncertainty where all possible outcomes and options for courses of action considered potentially viable in generating the outcome are seemingly unlimited. In other words, an entrepreneur faces greater uncertainty in the initial stage when they have yet to decide which customer needs can be better met and which solutions could better meet them (Harrison, 1977; Packard et al., 2017; Shepherd, Williams, & Patzelt, 2015). By
the time an entrepreneur launches a crowdfunding project, they have made an initial decision as to the specific opportunity to pursue, which essentially reduces the uncertainty. Entrepreneurs often use crowdfunding in the early stages of development where the desired outcome for the project has been decided, but the set of possible options that may produce the outcome is indefinite. For instance, an entrepreneur developing a product may still be experimenting with different technologies to develop or manufacture the final product (outcome) and therefore faces uncertainty about the technology (Folta, 1998), costs, and the probability of successfully developing the product (Dixit & Pindyck, 1994). Entrepreneurs also face uncertainty regarding the collective effect of all actors on the environment (potential reactions of customers, rivals, regulators, and other stakeholders) (Packard et al., 2017) including demand uncertainty for new products (Knight, 1921; Olson, Walker Jr, & Ruekert, 1995). Entrepreneurs need to resolve some of the uncertainty surrounding market demand to determine if the opportunity is valuable enough to commit to its full-scale exploitation (Choi & Shepherd, 2004). Because some of the uncertainty is partially endogenous, entrepreneurs can take actions to obtain information and learn. Crowdfunding allows entrepreneurs to present their products to customers and obtain feedback.

3.2.1.2: Information Search for Customers

On Kickstarter, the backers ‘invest’ in the entrepreneur’s project by choosing a reward offered by the entrepreneur, which is usually the product the entrepreneur is developing (Gerber et al., 2012). In this sense, backers become customers, similar to customers making a pre-order purchase of the product (Belleflamme et al., 2014).

Customers often have less information about the characteristics of the product and the behavior of the seller than the seller does. Market transactions between the parties may be
inefficient or even cease to take place due to the information asymmetry problem where one party has more or better information than the other (Akerlof, 1970a). Asymmetric information between parties creates the risk of adverse selection and moral hazard. In crowdfunding, customers can find it difficult to discern the quality of the product or service being offered before experience. The quality is related to how well the functional aspects of the product or service fulfill the customers need. Because the products are usually still in development, the quality ultimately depends on entrepreneur overcoming technical hurdles and is related to the entrepreneur's abilities (i.e., whether he or she is capable of completing the proposed project) (Stiglitz, 2000). Customers may also be concerned about the credibility of any claims since they lack information about the entrepreneurs’ post-crowdfunding behavioral intentions (i.e., potential fraud) (Stiglitz, 2000). In crowdfunding, the entrepreneur likely knows more about the underlying quality of the offering (including their ability and behavioral intentions) than potential customers (Ahlers et al., 2015; Courtney et al., 2017; Gerber et al., 2012; Mollick, 2014). The quality of the offering is therefore largely unobservable at the time the customer makes a pre-order decision and is often only revealed when the customer receives and experiences the product or service. A key point is that ‘trust’ and ‘credibility’ is important when one party has more information than the other. The credibility of the entrepreneur concerns the trust that potential customers place in the entrepreneurs’ promise to produce and deliver as specified. When customers cannot distinguish between high and low-quality offerings, entrepreneurs of ‘higher quality’ might be incentivized to take observable and costly actions to credibly signal their unobservable quality, to induce potential customers to pre-order their products (M. Spence, 1974). In crowdfunding, although the quality is unobservable, it can be
reflected, among other things, through the physical attributes of the product, product functionality, and the development stage of the project (Courtney et al., 2017).

3.2.1.3: Feedback

Feedback in this context is any positive or negative comment posted by potential or actual pre-order customers about a project, product, entrepreneur or company, which is made available to a multitude of people and institutions via the crowdfunding platform. In crowdfunding, pre-order customers can leave comments on the crowdfunding platform which are observable. Unlike comments left on other online consumer reviews, Kickstarter only allows those who have pre-ordered (pledged a financial contribution) to post a comment (i.e., feedback). The feedback becomes a permanent record and cannot be altered or hidden by any party. Customers only make a soft pre-order that can be changed or withdrawn before the end of the crowdfunding campaign. The pre-order will only be committed where the money will change hands if the project reaches the funding goal by the end of the campaign. Some people have been known to back a project just to warn others about the project and withdraw their pre-order. Here is an example from the Kickstarter platform of a negative comment which reflects such an act:

*Hi guys (especially the backers) I just pledged $1 just so I could leave this message (comment section is not available for non-backers) these bags from KAVA do look awfully similar to certain duffle bags that are available on ebay already. I reported it already to Kickstarter, but if anyway would like to check for themselves; here are the links...*

The information in each comment reflects an individual’s idiosyncratic assessment or knowledge that may or may not resonate with others’ and the information may be highly valuable or even irrelevant to others’ decision. Some comments may simply increase the noise.
3.3: CONCEPTUAL FRAMEWORK

We examine three important factors that influence the usefulness of feedback in decision-making: the identity of the feedback receiver (i.e., entrepreneur or customer), the nature of the feedback (i.e., positive or negative), and the other channels of information available to the information receiver.

Not all feedback is equal. Some feedback is perceived to be more diagnostic (i.e., helpful in facilitating decision-making such as evaluating a product or gauging product-market fit). Feedback can provide diagnostic value across multiple stages of the decision process. In this paper, we build on information economics to address the role of customer feedback in the decision process of customers (purchase decision) and entrepreneurs (opportunity evaluation decision). In the decision-making process, once someone recognizes the need for additional information to guide the choice, the person is likely to search for information. Berkeley and Humphreys (1982) suggest that judgments and decisions occur as responses to uncertainty where a person's subsequent behavior is a reflection of efforts to remove or cope with the uncertainty.

Feedback which is credible is often perceived as more useful. People often rely on their social ties to the feedback communicator to assess the usefulness of the feedback (Brown & Reingen, 1987; Knapp & Daly, 2002). The perceived usefulness of feedback may depend on important contextual variables such as the closeness of the social connection between the feedback provider and receiver (e.g., family and friends) (Brown & Reingen, 1987). In an online environment (i.e., crowdfunding), the provider and the receiver are often strangers where the lack of traditional social ties forces the receiver to evaluate message usefulness almost entirely based on the content of the message (Walther, 1996). In evaluating the credibility of feedback,
receivers are often concerned with whether the review seems genuine (i.e., attributes the review to product-related motivations), or disingenuous (motivated by self-serving or non-product related reviews) (Sen & Lerman, 2007). In general, customers tend to discount overly positive reviews as being less genuine. Unlike comments left on other platforms (i.e., Amazon.com), in our context ‘fake’ comments do not seem to be a major concern. On Kickstarter, only those who pledge a financial contribution (i.e., pre-order) are allowed to leave feedback, and it is not easy for an entrepreneur to deliberately obtain biased comments from multiple backers to the extent that they would alter the overall sentiment in the comments (Courtney et al., 2017).

Research in psychology and organizational behavior has shown that people respond differently to positive and negative stimuli. The literature seems to agree that positive and negative feedback are not equally weighed in the decision-making process. We outline how entrepreneurs and customers respond to feedback different depending on their information needs.

**3.3.1: Receiver identity and the nature of feedback**

**3.3.1.1: The feedback effect on the customer**

Much of the marketing literature has focused on the customer as the receiver of feedback. Customers search for feedback when they are unaware of product or seller quality and obtaining knowledge about quality improves decision-making.

Customers making purchase decisions for items which they have not yet experienced are usually unfamiliar with the characteristics of the product and the seller's credibility; while sellers often possess this knowledge. Therefore, customers rely on sellers to supply information. When a seller makes a product (quality) claim, the customer may not know if he/she can trust the claim without other information that verifies the claim. Opportunistic sellers may provide ‘false
claims’ or withhold key information. A key problem that arises out of this information asymmetry is not that sellers are unwilling to reveal information, but that sellers can report and reveal information selectively (Milgrom, 2008). And sellers have been known to reveal ‘good news’ and withhold ‘bad news’ (Milgrom, 1981). Even in cases where government regulations require a firm to disclose information about the risks associated with a product, firms may downplay the risks (Milgrom, 2008). Most advertisements, regardless of credibility, make claims about the positive attributes of products. Therefore, in addition to the information from the entrepreneur, in crowdfunding, customers often search for information from other sources to ascertain project quality and founder credibility.

In online environments such as crowdfunding, customers can actively engage in a search for information at low cost. Feedback, in the form of positive or negative comments posted by potential or actual customers about a project, product, entrepreneur or company, are widely available on the crowdfunding platform. Feedback for products already on the market has been shown to provide information about product characteristics and offer a valid composite measure of product quality (Chen & Xie, 2005, 2008; Eliashberg & Shugan, 1997; Tellis & Johnson, 2007). Therefore, similar to how feedback has been found to relate to the underlying product quality for products on the market and in line with previous crowdfunding research (Courtney et al., 2017); in crowdfunding, feedback provides some information regarding the underlying unobservable quality of the product and entrepreneur.

Because the entrepreneur is less likely to disclose negative information or downplay the risks when doing so, external sources of information (i.e., customer feedback) can be the only providers of negative information. Therefore, we expect that customers are likely more sensitive to negative feedback from third parties in their backing decision than to positive feedback. This
argument is in line with previous research which has found the marginal (negative) impact of negative feedback to be more influential than the (positive) impact of positive feedback (e.g., Chevalier & Mayzlin, 2006) in customers’ decision-making process. We thus hypothesize:

**Hypothesis 1:** Negative feedback will have a greater absolute effect than positive feedback on customers’ pre-order sales.

### 3.3.1.2: The feedback effect on the entrepreneur

Identifying and selecting the right business opportunities is important for entrepreneurs (Stevenson, Roberts, & Grousbeck, 1994). The creation of business follows the opportunity development process including the recognition of an opportunity, its evaluation, and if it progresses, its development. Entrepreneurs evaluate opportunities at each stage of their development, although the evaluation may be informal or even unarticulated (Timmons, Muzyka, Stevenson, & Bygrave, 1987). The development process is cyclical and iterative: an entrepreneur is likely to conduct evaluations several times at different stages of development (Ardichvili et al., 2003). Opportunity evaluation typically results in entrepreneurs deciding to either 1) continue as planned, 2) adjust the initial vision (alter course/pivot), or 3) abandon the opportunity (Ardichvili et al., 2003; Wood & McKinley, 2010). The evaluation could also lead to recognition of additional opportunities (Ardichvili et al., 2003) which could result in the entrepreneur abandoning the original opportunity due to their limited resources or adjusting the initial vision to include these new opportunities.

On crowdfunding platforms such as Kickstarter, entrepreneurs have the option to cancel the project before the project funding period ends. The reasons for canceling projects on Kickstarter can usually be categorized as either opportunity abandonment or a substantial
adjustment of the initial vision (pivoting) in which projects are canceled and often relaunched at a later time. Therefore, an entrepreneur who cancels his/her project decides to alter the previous decision by abandoning the opportunity or making substantial changes; while others pursue the original opportunity, possibly with trivial adjustments.

Although entrepreneurs know a great deal about their project, during the development phase, they often face uncertainty regarding the product-market fit (i.e., whether the product meets the customer need and the resulting demand) and the possible options that may produce the desired outcome (i.e., technology and costs). Entrepreneurs need to resolve some of the uncertainty surrounding market demand to determine if the opportunity is valuable enough to commit to its full-scale exploitation (Choi & Shepherd, 2004). Because the uncertainty they face is partially endogenous, entrepreneurs can take actions to obtain information and learn.

Crowdfunding provides a platform that allows entrepreneurs to learn. Once entrepreneurs presents their projects to the world, they can obtain feedback which may be particularly helpful in the early stages of development when uncertainty is partly about the product-market fit (Sivadas & Dwyer, 2000). Entrepreneurs often seek customer feedback to resolve uncertainty (Busenitz & Arthurs, 2007; Gerber et al., 2012; Onyemah et al., 2013) in the hopes of decreasing the resources allocated toward non-profitable opportunities. Mollick and Kuppuswamy (2014) surveyed entrepreneurs from Kickstarter crowdfunding campaigns and found that respondents

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5 Once a project has been launched Kickstarter does not allow changes to the funding deadline or major changes such as the funding goal. The Kickstarter community tends to suggest that when making changes to the project that the project creators cancel the project and relaunch with the changes. For instance, A K Nicholas, a creator of 19 projects offers this advice, “If you have a reason to change something and relaunch soon, then cancelling may be a good idea.” A project creator who followed this advice, Ian Tadashi Moore, commented “I'm going to cancel my project, because I've realized what some of the issues are. I'm crafting an update that lets everyone know 1) I'm canceling, 2) there will be a reboot within a couple of weeks” (see: https://www.kickstarter.com/campus/questions/what-are-the-pros-and-cons-of-canceling-a-project-that-is-about-to-fail). Minor changes are allowed and often are introduced through project updates.
reported learning about demand to be the most important motive for crowdfunding, ahead of funding. Individual customers typically have knowledge about their own needs, their willingness to pay, etc. Therefore, although each customer may only have a piece to the puzzle, in aggregate, customers can provide valuable feedback to the entrepreneur about the product-market fit or the best way to achieve the desired outcome. Feedback can provide valuable information which the entrepreneur can use in determining probabilistic relationships between options and outcomes (i.e., resolve some of the uncertainty).

Higher percentages of positive feedback may indicate that the offering resonates well with customers thereby suggesting a greater likelihood of having product-market fit. Quite the opposite, greater percentages of negative feedback likely suggest the opportunity, in its current form, has a lower probability of having a product-market fit. When evaluating opportunities which are perceived to have (lack) product-market fit or be more (less) technically feasible, ‘economically rational’ entrepreneurs are less (more) likely to pivot or abandon the opportunity. In other words, all else being equal, greater positive (negative) feedback should decrease (increase) the likelihood that an ‘economically rational’ entrepreneur discontinues their crowdfunding project.

When the feedback provides information about the customer’s personal demand preference, positive feedback is likely more helpful than negative feedback in identifying a target market. Negative feedback may provide clues as to whom the product does not resonate with and help to rule out a potential target market. Since positive feedback likely indicates that the product

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6 Critics of this thinking may cite Henry Ford or Steve Jobs who suggesting that “It’s really hard to design products by focus groups. A lot of times, people don’t know what they want until you show it to them.” Although prospective customers may or may not be able to articulate their needs, interests, or problems; they are often still be able to recognize the value to them in something new when they are presented with it and have its operation and benefits explained (Von Hippel, 1994).
resonates with an individual, it is helpful in identifying a specific target-market. Information which identifies a specific target-market has greater informational value in eliminating many other possibilities, especially for crowdfunding projects that are often in the early stage of development. Additionally, in crowdfunding, those that are not part of the target market are less likely to pre-order and self-select to provide feedback.

Since the members of the crowd have heterogeneous information, some members may provide negative feedback about problems or things that they do not like. Others may take an approach toward providing positive information about their demand level or even provide potential solutions. For instance, (Afuah & Tucci, 2012) discuss crowdsourcing’s potential for solving problems where some members of the crowd self-select to provide solutions when they recognize the problem and can provide a solution at low cost because the knowledge needed is in their immediate knowledge domain. These solutions may be more or less optimal than the solution the entrepreneur could have reached given their knowledge domain. In studying the motivation for members of a crowd to self-select to provide solutions without being paid researchers have found that those engaged in open source projects were motivated by positive factors such as the opportunity to build a reputation in the community, make a positive difference, work on something cool, and enjoy the fun of solving a problem (Shah, 2006; Von Krogh & Von Hippel, 2006). Since entrepreneurs likely observe feedback in an attempt to overcome the uncertainty they face, positive feedback is likely helpful because it provides guidance on how to proceed. On the other hand, feedback that indicates something is bad is not as helpful because information about what one should not do still leaves an almost infinite combination of what one could consider as alternatives.
In a nutshell, crowdfunding entrepreneurs search for information to achieve a product-market fit by meeting a specific customer need. While positive feedback offers specific guidance on the potential solutions, negative feedback only indicates what does not work but provides little guidance on what works. It is worth noting that the entrepreneurial decision in this context differs from the customer decision which can often be simplified as a decision to back or not (pre-order or not in rewards-based crowdfunding).

Thus, we propose:

**Hypothesis 2:** Positive feedback will have a greater absolute effect than negative feedback on entrepreneurs’ decision to discontinue crowdfunding.

### 3.3.2: Information search from multiple sources

#### 3.3.2.1: The customer and available information.

Limited information about quality (an opportunity) leads customers (entrepreneurs) to obtain knowledge to improve decision-making. When one source of information is not available, people increase the search for information from other sources. Further, the marginal effect of feedback, whether positive or negative, decreases as other sources of information are available for customers. When customers become aware of the crowdfunding product offering (i.e., first visit the project page), the first page they see contains information that is provided by the entrepreneur. The entrepreneur can choose how to frame the message, how much information to reveal, etc. Although entrepreneurs likely have more knowledge than any individual feedback provider about product or seller quality, their messages are often viewed as less credible because the messages may be viewed as being communicated for reasons of self-interest and therefore more prone to bias (Milgrom, 2008). If there were no information asymmetry and the customer
had the same information as the entrepreneur, they may not be inclined to incur the cost of additional search in making their purchase decision. While it is unlikely that the information asymmetry problem can be completely mitigated, in crowdfunding, entrepreneurs can lower information asymmetry by choosing to reveal their underlying quality by providing costly signals of firm quality, which likely changes the cost-benefit equation for customer’s search for additional information. In crowdfunding, one such signal that entrepreneurs can employ is the use of higher levels of media (i.e., video and images) (Courtney et al., 2017; Mollick, 2014). Courtney et al., (2017) and Mollick (2014) suggest that projects which include video and images are likely at a more developed stage and have met at least minimum preparation for crowdfunding; and the likelihood of the entrepreneur developing and delivering the product with the specified functionality in the particular time frame promised will be higher. This enhances potential customers’ trust in the entrepreneur’s promise. Signaling are costly to produce which adds credibility to the message and therefore are more reliable as a source of information than feedback from the crowd which may be less costly or even ‘costless’ to produce. Further, signals in the form of higher levels of media tend to be among the easiest to understand. Together these arguments indicate that customers receiving the signals are likely to have a lower level of information asymmetry and therefore perceive the marginal benefits of additional search to be less. In other words, when entrepreneurs provide more credible information to convey their quality, customers benefit less from searching for additional information. Based on this, we hypothesize:

**Hypothesis 3:** (a) Positive and (b) negative feedback will have less effect on customers’ pre-order sales when crowdfunding projects have higher levels of media.
3.3.2.2: The entrepreneur and available information.

Entrepreneurs often learn as their ventures progress through the stages of development. Since projects which include video and images are likely at a more developed stage and have met at least minimum preparation for crowdfunding, entrepreneurs that produce higher levels of media likely face less information need than those without video and images. Therefore, when entrepreneurs provide higher levels of media, they likely benefit less from searching for additional information. Therefore, we posit:

**Hypothesis 4:** (a) *Positive and (b) negative feedback will have less effect on entrepreneurs’ decision to discontinue crowdfunding when crowdfunding projects have higher levels of media.*

3.4: DATA AND METHODS

3.4.1: Sample and Data

We collected data on all crowdfunding projects on the Kickstarter platform since its inception on April 21, 2009, through December 27, 2015. Kickstarter is one of the world’s largest crowdfunding platforms, and Kickstarter data have been commonly used in prior research (e.g., Chan & Parhankangas, 2017; Courtney et al., 2017; Mollick, 2014). The population of data contains 267,295 projects of which 36.87% are successful in raising over USD 1.86 billion. We focus on projects based in the United States raised in USD (to control for cross-border institutional and cultural differences), with a goal of at least $100 and no more than $1,000,000. These filters remove projects which are not considered to be serious efforts and those which set unrealistic goals (Mollick, 2014). Because we are interested in the feedback effects, we confine our analysis to the 81,864 projects with feedback (i.e., comments left by the crowd during the time the project is active). Projects are categorized as one of the following: successful, failed,
canceled, or suspended. Successful projects are those that have met their funding goal. Failed projects have not met their funding goal. Projects that have been withdrawn from Kickstarter by the project founder before the close of the funding round are considered canceled. Canceled projects do not raise any money as all pledges are voided upon cancellation. Suspended projects are those which Kickstarter’s Integrity team uncovers evidence that it is in violation of Kickstarter's rules and Kickstarter stops, voiding all pledges.⁷

3.4.2: Dependent Variable - Decisions

Theoretically, we are interested in how feedback and other available information influence the decisions of both customers and entrepreneurs. We posit that they will respond differently to the same feedback because of their different roles and information needs.

Customers. We are primarily concerned with the customer’s purchase decisions. Our review of the prior research has revealed that studies on the influence of customer feedback in the form of customer reviews, on customer purchasing decisions can be classified into two levels: market-level and individual-level analysis. For a review of studies using individual-level analysis see (Cheung & Thadani, 2012) and for market-level analysis see (Feng Zhu & Zhang, 2010). Those using market-level analysis often measure the customers purchasing decisions in terms of product sales (Chen & Xie, 2005; Chevalier & Mayzlin, 2006; Clemons, Gao, & Hitt, 2006; Dellarocas, Zhang, & Awad, 2007; Duan, Gu, & Whinston, 2008; Feng Zhu & Zhang, 2010). While, other studies using individual-level analysis use purchase intention (Park & Kim, 2008). In the crowdfunding context, the customer’s decision to fund a project is similar to a

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⁷ Suspended projects included in our dataset are those which launched and subsequently suspended. Kickstarter lists many of the reasons why a project may be suspended. See: https://www.kickstarter.com/help/search?&term=suspended
traditional pre-order purchase. The customer also has the option to select different reward levels at different prices. For example, a customer for a book crowdfunding project may choose between a standard project reward (e.g., softcover) and a premium version (e.g., hardcover) at a higher price. Therefore, we measure the amount of revenue that customers commit during the time the project is active as the cumulative amount contributed by all customers. The dependent variable, *Pre-order Revenue*, is the natural logarithm of one plus the amount of money the campaign raised in total.

**Entrepreneurs.** We are primarily interested in understanding how customer feedback may influence the entrepreneur’s decision to continue the project as originally intended (which will result in failure or success) or alter course (e.g., by making substantial changes or abandoning which will lead to cancelation). On Kickstarter, entrepreneurs, as project creators, can pick the duration of time the project is active in raising money from customers (known as backers on the platform). The time is now limited to 60 days although originally limited to 90 days. During this time, entrepreneurs may discover new information about the opportunity and are therefore given the option to cancel the project before the project funding period ends. The reasons for canceling projects on Kickstarter can usually be categorized as either opportunity abandonment or a substantial adjustment of the initial vision (pivoting) in which projects are canceled and often relaunched at a later time.\(^8\) Those who continue their project (do not cancel)

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\(^8\) Once a project has been launched Kickstarter does not allow changes to the funding deadline or major changes such as the funding goal. The Kickstarter community tends to suggest that when making changes to the project that the project creators cancel the project and relaunch with the changes. For instance, A K Nicholas, a creator of 19 projects provides this advice, “If you have a reason to change something and relaunch soon, then cancelling may be a good idea.” A project creator who followed this advice, Ian Tadashi Moore, commented “I'm going to cancel my project, because I've realized what some of the issues are. I'm crafting an update that lets everyone know 1) I'm canceling, 2) there will be a reboot within a couple of weeks” (see: [https://www.kickstarter.com/campus/questions/what-are-the-pros-and-cons-of-canceling-a-project-that-is-about-to-fail](https://www.kickstarter.com/campus/questions/what-are-the-pros-and-cons-of-canceling-a-project-that-is-about-to-fail)). Minor changes are allowed and often are introduced through project updates.
continue as originally planned or may make trivial adjustments to the project. For hypotheses regarding the entrepreneur, the dependent variable, *Canceled*, is a dummy variable, equal to one if the entrepreneur canceled the project. This approach allows us to compare the entrepreneurial decision to continue as originally planned with the decision to alter course (either abandon the opportunity or make substantial pivots).

### 3.4.3: Explanatory Variables

**Positive and negative feedback.** To understand the impact of comments on customer pre-orders and the entrepreneur’s decision to discontinue the project we first create an aggregate measure of the crowd’s comments. First, we exclude comments from the entrepreneur. Next, we identify the time that a comment was made and remove all comments which were left after the crowdfunding campaign ended. This leaves us with only comments left by the crowd while the project is active. To be consistent with prior literature (e.g., Basuroy, Chatterjee, & Ravid, 2003; Eliashberg & Shugan, 1997), for each project, *POSRATIO (NEG RATIO)* is the number of positive (negative) comments divided by the number of total comments. While Basuroy et al. (2003) and Eliashberg and Shugan (1997) found *POSRATIO* and *NEG RATIO* to be highly correlated (e.g., \( r = -.88 \)) and decided to use the number of positive and number of negative comments to avoid issues with multicollinearity; the data here does not suffer from such a high correlation (\( r = -.477 \)).

To determine the classification of each comment, either positive, negative, or neutral, we conduct a sentiment analysis using the program SentiStrength. SentiStrength analyzes written

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9 The number of positive and number of negative comments are highly correlated in our sample (\( r = .967 \)). Basuroy, Chatterjee, and Ravid (2003) and Eliashberg and Shugan (1997) use the number of positive and number of negative comments because they find POSRATIO and NEGRATIO are highly correlated in their sample.
text using a computer-based algorithm to estimate both the positive valence and negative valence of the author. SentiStrength has been used in prior literature (Ferrara & Yang, 2015; Stieglitz & Dang-Xuan, 2013; Thelwall et al., 2010, 2011) because it can handle informal language using a human-designed lexicon of emotional terms with a set of additional linguistic rules for negations, booster words, amplifications, emoticons, spelling corrections, and word weighting.

SentiStrength classifies the text in each comment as positive on a scale of 1 (neutral) to 5 (strongly positive) and negative on a scale of -1 (neutral) to -5 (strongly negative). Based on previous literature (e.g., Stieglitz & Dang-Xuan, 2013) we first determined the sentiment polarity (i.e., emotional valence) of each comment as,

\[ \text{Polarity} = \text{positive} + \text{negative} \]

where positive denotes the SentiStrength positive score (1 to 5), and negative denotes the negative sentiment score (-1 to -5). When the polarity is greater (less) than zero, the comment is classified as overall positive (negative). Comments are classified as neutral when the polarity is exactly zero.

**Media** is equal to zero if a project has no video and no image, one if it has only images, two if it has only a video, and three if it has both images and video.

### 3.4.4: Control Variables

We include controls to account for alternative explanations, some of which have been used in prior crowdfunding studies. The greater the volume of feedback, the more likely a customer will be able to hear about a product. Therefore the volume of feedback may increase awareness which tends to be associated with greater sales (Liu, 2006). Although the marketing literature has generally found feedback volume to positively impact sales (e.g., Basuroy et al.,
2003; Eliashberg & Shugan, 1997), others have found volume itself to be insufficient (Chintagunta, Gopinath, & Venkataraman, 2010). Prior crowdfunding studies have found the volume of comments to be related to a project’s success (Courtney et al., 2017). Therefore, we include the control variable *Feedback Volume* as the total number of comments left by the crowd. Additionally, the number of potential customers that are made aware of the offering through social media may impact the number of pre-orders. Therefore, we include *FB Shares* as the log of one plus the number of Facebook shares the project has.

To account for the impact of the entrepreneur’s social network, we collect the number of friends the entrepreneur has on Facebook from the Kickstarter bio. Some entrepreneurs do not link their Facebook account. Therefore, we proceed in line with Courtney et al. (2017) and Mollick (2014) and generated dummy variables for those in the top 50th percentile, *FBtop50*, and those in the bottom half, *FBbottom50*. The excluded reference group includes those entrepreneurs with no linked Facebook account. To account for the crowdfunding network of the entrepreneur we include *Projectnum* as the natural logarithm of one plus the count of the number of previous crowdfunding projects the entrepreneur has had. Once the entrepreneur has launched a project, they can post updates to the project, which potential customers may evaluate. A dummy variable, *Quick Updates*, is equal to one if the entrepreneur posts at least one update within the first three days of the project start (Mollick, 2014).

At the project level, some factors have been shown to impact project funding. *Project Goal* is the log-transformed measure of the entrepreneur’s pre-set funding goal. *Duration* is the logarithm of the number of days when a project is active and pre-orders can be made. Projects which have more spelling errors may demonstrate reduced preparedness or quality and are often less likely to reach the funding goal (Mollick, 2014). *Spelling Error* is a dummy variable equal to
one if a project has a spelling error in the description. The length of the description can influence the amount of customer’s attention devoted to the project. We measure the length by taking the natural logarithm of the number of Words in the description. A greater diversity of product offerings may also influence the choice to pre-order in crowdfunding Rewards is the log of one plus the number of different pre-order options (rewards) available. The amount of additional information available online that is related to the product or the entrepreneur may also influence the pre-order decision. Therefore, we include URL Links as the logarithm of one plus the number of external URL web links in the project description.

For the entrepreneurs, they may be influenced to continue due to the money they raise which is hard to separate from what they might learn about demand by observing pre-sale orders. To control for the influence which this level of funding has, we include a measure Percent Goal which is equal to the percent of the funding goal the project has raised to a maximum of 1 if they reach the goal.

Although the effect of geography in crowdfunding is inconclusive (G. Burtch et al., 2014), we attempt to account for geographic differences due to the location of entrepreneurs and their projects by including state dummy variable for California, Florida, Illinois, New York, and Texas as they are the top five states in terms of the number of projects. To account for differences across project categories, we include dummy variables for each Kickstarter category. Lastly, to control for unobservable time-varying effects, we include dummy variables for the year of project launch.
3.4.5: Estimation Models

Following extant research, we use a log-linear formulation for the dependent variable *Pre-order Revenue* (Duan et al., 2008; Elberse & Eliashberg, 2003; Liu, 2006) and apply ordinary least squares regression models to test H1, H3a, and H3b. The log-linear formulation is consistent with theoretical models of a multistage customer decision-making process, where sales can be viewed as a series of conditional probabilities applied to the customer base (Duan et al., 2008). We employ the logit regression model to test H2 and H4 regarding the entrepreneur’s propensity to cancel a project.

3.4.6: Results

Table 3-1 reports the results of hypothesis testing. Models 1 and 6 include the controls only. Models 2-5 test the hypotheses about the level of customer pre-order revenue and Models 7-10 about the likelihood of an entrepreneur canceling a project.

H1 predicts that negative feedback will have a greater absolute effect than positive feedback on customers’ pre-order revenue. In Model 2, *POSRATIO* has a positive but statistically insignificant coefficient estimate ($\beta = 0.03, p > 0.05$). *NEGRATIO* has a negative and statistically significant coefficient estimate ($\beta = -0.48, p < 0.01$), suggesting that a project with a higher level of negative feedback has lower pre-order revenue. A Wald test shows that the difference between the absolute value of the coefficients ($|\beta_{NEGRATIO}| - |\beta_{POSRATIO}|$) is positive and statistically significant, providing support for H1.

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10 In crowdfunding, a simple two-stage customer decision model implies the following: pre-order sales = customer base $\times$ percentage of customers aware of the project offering $\times$ percentage of customers choosing to pre-order given their awareness.
H2 predicts that positive feedback will have a greater absolute effect than negative feedback on the entrepreneur’s decision to cancel a project. We would expect a project with a high level of positive feedback to be less likely to be canceled by the entrepreneur. In Model 7, \( POSRATIO \) has a negative and statistically significant coefficient estimate \( (\beta = -0.23, p < 0.01) \), suggesting that a project with a high level of positive feedback is less likely canceled. \( NEGRATIO \) has no statistically significant coefficient estimate \( (\beta = -0.06, p > 0.05) \). A Wald test shows that the difference between the absolute value of the coefficients \( (|\beta_{POSRATIO}| - |\beta_{NEGRATIO}|) \) is positive and significant, providing support for H2.

H3 predicts that feedback will have less effect on customers’ pre-order revenue when entrepreneurs provide higher levels of media to signal the quality. Model 4 includes the interaction term \( Media \times POSRATIO \); it is negative and only marginally significant \( (\beta = -0.04, p < 0.10) \), providing only partial support for H3a. This is likely because we found that positive feedback did not have a significant effect on the customer pre-order decision as measured by the aggregate pre-order sales revenue. Model 5 includes the interaction term \( Media \times NEGRATIO \); it is positive and statistically significant \( (\beta = 0.16, p < 0.01) \), providing support for H3b. This suggests that when an entrepreneur provides credible information (signals of firm quality), customers are less likely to search for additional information or when doing so the negative impact of negative feedback is lessened.

H4 posits that feedback will have less effect on an entrepreneur’s propensity to cancel their crowdfunding project when they are at a more advanced stage of development. In Model 8, the interaction term \( Media \times POSRATIO \) is not significant. Similarly, in Model 9 the interaction term \( Media \times NEGRATIO \) is not significant. A full model for H4 is presented in Model 10. The
empirical model does not support H4a and H4b. This may be a result of the way we measure the entrepreneur's stage of developmental.

Overall the findings suggest that negative feedback is more informative than positive feedback for the customer deciding about pre-ordering a product. In contrast, entrepreneurs tend to focus on the positive feedback and find little or no value in negative feedback. These findings together suggest that customers and entrepreneurs process feedback quite differently.

3.5: DISCUSSION

Feedback can provide a valuable source of information which individuals and organizations can use to learn from (Cyert & March, 1963). This essay advances our understanding of how feedback is used in the decision-making processes of entrepreneurs and customers during new product introduction which is fraught with information concerns. Drawing on the information search and processing literature we find that entrepreneurs and customers respond differently to negative and positive feedback because of their different roles and information needs. We expect that when customers make a purchasing decision, they give greater weight to negative feedback than positive feedback because it may provide the sole source of negative information whereas positive information is usually found elsewhere (i.e., provided by the entrepreneur). In comparison, we propose that entrepreneurs tend to find positive feedback more diagnostic while facing uncertainty regarding an opportunity as it likely provide better guidance about what to do. Information that helps to select a specific option helps to eliminate many if not all other options. Whereas negative feedback may only provide information about what not to do (i.e., remove one options from consideration) and is therefore often less helpful given a large number of available options.
We propose that the feedback effect will be more salient in the absence of other information sources. In other words, the marginal effect of feedback, whether positive or negative, decreases as other sources of information are available. We find some empirical support for this regarding the customer although the data did not support this prediction for the entrepreneur. While we suspect that this may be in part due to the way we measure the other information available to the entrepreneur, we cannot be sure this is the case. We suggest that future research could advance our understanding by exploring this further, possibly using an experimental setting. We are limited in our measurement and it is quite possible that having a more accurate measure may provide better insight.

3.5.1: Contributions

This study makes several contributions to the literature. First, strategy scholars have placed a great deal of attention toward the decision-making process used by entrepreneurs while a separate stream of marketing literature has expanded our understanding of the customers' decision process. This essay is among the first to specifically focuses on the differences between the decision-making of entrepreneurs and customers. We propose that the decision-making of entrepreneurs is different from those of customers because of the different roles and information needs they face. Specifically, this study addresses how these differences influence the processing of feedback. Second, research in psychology and organizational behavior has shown that people respond differently to positive and negative stimuli, but whether the response differs across groups remains an open question. We suggest that the role and information needs of people plays a role and as such entrepreneurs and customers will respond differently to the same feedback. Our empirical analysis supports our predictions that while customers give greater weight to negative feedback when making decisions, entrepreneurs’ decisions are more influenced by
positive feedback. Third, often multiple pieces of information influence decision-making. In addition to feedback, the decision-making of entrepreneurs and customers also depends on the availability of other sources of information. Therefore, we propose and finds empirical support for the feedback effect being more salient absent other sources of information. Fourth, our unique context, reward-based crowdfunding, provides feedback at a time where it may be useful in decision-making for both customers and entrepreneurs. In rewards-based crowdfunding, entrepreneurs introduce new products and services, which are often not yet on the market in finished form, in environments in which uncertainty and information asymmetry are prevalent. As such, both entrepreneurs and customers search for additional information. While extant literature has used feedback for products and services already released and available in the market, this essay is among the first to study feedback for pre-release products which are often still in the product development stage.

3.5.2: Teaching Implications

In an attempt to decrease uncertainty associated with new product development, the ‘lean start-up’ methodology introduces a continuous ‘Build, Measure, Learn feedback loop’ where entrepreneurs learn from customer feedback to test their business model assumptions (Blank, 2013; Ries, 2011). However, little is known about how customer feedback is processed. We show that feedback’s usefulness depends on the identity of the feedback recipient, the nature of the feedback, and the available channels of information. We find that entrepreneurs tend to pay greater attention to positive feedback than negative feedback, but that customers find negative feedback more diagnostic. Therefore, entrepreneurs need to be aware of the factors that may guide their decisions. Our findings that feedback has a larger effect in the absence of other sources of information also suggests that entrepreneurs can decrease the customer’s reliance on
feedback [out of their control] by providing more information (signals) of firm quality [in their control].

3.6: CONCLUSION

New product introduction presents unique information challenges for both those developing the products (entrepreneurs) and for those they are designed to benefit (customers). Feedback can provide a valuable source of information which for both parties. This essay extends current research by addressing the influence of feedback and additional sources of information on both entrepreneurs and customers. In this process, we seek to advance the application of information search and processing by examining how the identity and role of the feedback receiver and their information needs influence the usefulness of feedback. We further examine when feedback is more valuable. We hope this study encourages future theory development around the usefulness of feedback.
### Table 3-1: Correlation matrix and descriptive statistics

| Variable          | Obs | Mean | SD  | Min | Max  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 |
|-------------------|-----|------|-----|-----|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Pre-order Revenue | 209367 | 5.96 | 3.19 | 0   | 16.83 | 100| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Canceled          | 209369 | 0.09 | 0.28 | 0   | 1.00  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Media             | 209369 | 1.92 | 1.10 | 0   | 3    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| PO SRATIO         | 81864 | 0.70 | 0.33 | 0   | 1.00  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| NEG SRATIO        | 81864 | 0.08 | 0.19 | 0.00 | 1.00  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Project Goal      | 209369 | 8.64 | 1.50 | 4.62 | 13.82 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Duration          | 209369 | 3.48 | 0.38 | 0   | 4.52  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Spelling Error    | 209369 | 0.24 | 0.43 | 0   | 1    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Quick Updates     | 209369 | 0.24 | 0.43 | 0   | 1    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| FBtop50           | 209369 | 0.28 | 0.45 | 0   | 1    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| FBbottom50        | 209369 | 0.28 | 0.45 | 0   | 1    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| FB Shares         | 209369 | 1.57 | 2.40 | 0   | 13.68 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Rewards           | 209369 | 2.05 | 0.60 | 0   | 5.43  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| URL Links         | 209369 | 0.64 | 0.85 | 0   | 5.26  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Words             | 209369 | 5.89 | 0.99 | 0   | 10.37 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
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| Percent Goal      | 209369 | 0.44 | 0.46 | 0   | 1.00  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

Notes: Each variable is natural logarithm, n = 59,992,264. Bold p > 0.05, Italic p < 0.05, all other p < 0.001.
### Table 3-2: Predictors of Customer Pre-order and Entrepreneur Project Cancellation

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Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
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