Here Comes The Sun:
The Impact of Incidental Contextual Factors
On Entrepreneurial Resource Acquisition

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ABSTRACT

This paper focuses on investment decisions in nascent, seed-stage startups, where information is scarce and uncertainty is intense. The entrepreneurship literature shows investment is a function of the investor-startup pair; some studies investigate startup characteristics, while others focus on investor traits. We complement extant work by studying factors beyond the investor-startup pair; namely, incidental contextual factors such as changes in the physical environment. Drawing on affect-as-information theory, we conjecture that, in the face of intense uncertainty, sunnier days may affect investors' mood and result in a greater likelihood of investment. Archival and experimental analyses inform our predictions. The former utilizes proprietary data on 1,335 startups graduating from European accelerators. Every accelerator holds a Demo Day, where startups pitch to investors. We find that graduating on a 'sunnier' day increases the likelihood of investment. The 'sunnier' effect is stronger under intense uncertainty, where startups (a) are nascent, or (b) the founders have limited human-capital. An experimental study where prospective investors evaluate a Demo Day pitch yields further insights. Not only do we find a positive sunshine-investment association, but also document the association is mediated by investors' mood. Our findings complement extant work and contribute to the understanding of seed-stage investment decisions.

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Resource acquisition is a central feature of entrepreneurship. There has been significant recent interest in studying the mobilization of resources at the earliest stages of the entrepreneurial journey (Clough, Fang, Vissa & Wu, 2019; Huang, 2018). This reflects the sheer magnitude of early-stage activity, with over 4,700 seed-stage investments globally in 2019.[1] Notably, seed-stage startups have no sales and face uncertainty on multiple fronts, including the viability of the technology, the ability to attain product-market fit, and the feasibility of the business-model. Seed-stage investment, thus, is plagued by limited information and intense uncertainty (Ewens, Nanda, Rhodes-Kropf, 2018; Huang & Pearce, 2015). This begs the question: What explains seed-stage investment patterns? What factors affect investors' decisions to fund highly uncertain startups?

The entrepreneurship literature has a long tradition of studying investment patterns (Franke, Gruber, Harhoff & Henkel, 2006; Forbes, 2005; Vissa, 2011). The work broadly maps onto two distinct views. One view focuses on the characteristics of a focal startup. These studies document a set of startup-specific characteristics that investors focus on (Tyebjee & Bruno, 1984; Macmillan, Siegel, & Subbanarasimha, 1985; Franke, Gruber, Harhoff & Henkel, 2008; Petty & Gruber, 2011). Another view is concerned with investors. These studies uncover behavioral factors, such as social and cognitive influences, that systematically shape investment decisions (Brooks, Huang, Kearney & Murray, 2014; Franke et al., 2008; Guler, 2007; Vissa, 2011; Zacharakis and Shepherd, 2001). In sum, extant work explains variation in investment patterns as a function of the characteristics of the startup-investor pair.[2] It is not a surprising conclusion, given

[1] Pitchbook data accessed March 25, 2020.
[2] Empirically, extant work studies investment as a function of the investor-startup pair; one stream focusing on the latter (heterogeneity in startup characteristics), and the other on the former (heterogeneity in investor traits).

that the work has traditionally studied situations where information about startups' business traction or investors' track record is available. At the seed stage, however, information is scarce and uncertainty is intense. Thus, identifying the factors that systematically affect seed-stage investment patterns calls for an investigation of a broader set of possible factors.

The purpose of this paper is to address this call. We draw on contiguous disciplines with a long tradition of studying decisions under uncertainty. Behavioral economics and social psychology find that mood plays a key role in driving decisions (Loewenstein & Lerner, 2003). A notable finding is that incidental factors—namely, factors that are unrelated to the task at hand—can affect mood and sway decisions (Bodenhausen, 1993; Elfenbein, 2007; Rick & Loewenstein, 2008; Schwarz & Clore, 1983). This insight has been fully developed by affect-as-information theory (Clore & Schwarz, 1983; Loewenstein & Lerner, 2003). It argues that contextual factors (such as a change in the physical environment) can tip the balance towards specific decisions. Building on this theoretical mechanism, we seek to complement extant entrepreneurship literature. We posit that our understanding of seed-stage investment patterns could benefit from studying not only the characteristics of the startups or investors but also the role of incidental contextual factors, such as the environment in which the pair is situated.

We focus on one incidental factor that has been frequently studied in the affect-as-information literature; daily sunshine (Schwarz & Clore, 1983; Hirshleifer & Shumway, 2003). A daily change in realized sunshine duration constitutes a fleeting change in the physical environment. Importantly, this incidental change does not reveal any information about the focal startup, per se. It can, nonetheless, have a systematic impact on entrepreneurial resource acquisition. Exposure to sunshine acts as a stimulus and is associated with a better mood in general (Eagles, 1994; Kripke, 1994; Rind, 1996; Saunders, 1993), and among early-stage investors in

particular (see Figure 1 for anecdotal evidence). We conjecture that an investment is more likely if the entrepreneurial pitch is on a day that experiences an increase in sunshine.

We test the predictions using archival data as well as an experimental study. The accelerator phenomenon offers an ideal setting for our investigation. Accelerators are fixed-term, startup-education programs that are an important source of seed-stage startups.[3] An accelerator program culminates in an investor roadshow called 'Demo Day,' where all graduating startups pitch to a group of leading investors. We construct a comprehensive dataset of 1,335 early-stage startups graduating from leading European accelerators over 171 Demo Days. We find that startups graduating on a 'sunnier' day (i.e., Demo Day receives more sunshine than the preceding day) experience a greater likelihood of securing a Demo Day funding round compared to those graduating on 'non-sunnier' days. We further document that the 'sunnier' effect is sensitive to the level of uncertainty. Two moderators are observed: the effect is stronger for less mature startups, and those whose founders exhibit limited human capital.

***** Insert Figure 1 about here *****

The experimental study substantiates the underlying theoretical mechanism (i.e., mood), which cannot be observed using archival data. Prospective investors watched a video of a Demo Day pitch and were asked to evaluate the investment opportunity. The findings replicated the real-world evidence of a positive sunshine-investment association. Further analyses find evidence in support of our theoretical mechanism; namely, the positive association is mediated by investors' mood. Taken together, the analyses document the impact of incidental factors in early-stage investments using both naturally occurring moods (Study 1: archival study) as well as participants with induced mood states (Study 2: experimental study).

[3] http://pitchbook.com/news/articles/one-third-of-us-startups-that-raised-a-series-a-in-2015-went-through-an-accelerator

To conclude, our study complements extant entrepreneurship literature. It contributes several nuanced insights, which are discussed in the conclusion section. For example, extant work shows that investment patterns reflects the heterogeneity in (a) startups' quality or (b) investors' cognitive style. We propose a third explanation, which looks at factors outside the investor-startup pair; namely, that variation may arise even in the case of a homogeneous pool of investors and startups, simply because some pairs are exposed to incidental contextual factors while others are not. The insight echoes work in behavioral economics, which underscores incidental contextual factors as key to understanding variation in decision making (Simonsohn, 2007). In other words, our understanding of seed-stage investment patterns would benefit from juxtaposing contextual factors in addition to traditional factors related to the investor-startup pair.

THEORY DEVELOPEMENT

Investment Decisions: Intense Uncertainty at the Seed Stage

Over recent decades, we witnessed a significant decrease in the cost of starting a business, which brought about a proliferation of nascent entrepreneurial ventures (Ewens, Nanda & Rhodes-Kropf, 2018). These ventures—often referred to as seed-stage startups—usually have limited resources and are vying for capital. A parallel expansion took place on the investor side, with a vibrant community of angel investors, as well as the entrance of new investor types, such as business accelerators (Clough, Fang, Vissa & Wu, 2019; Drover, Busenitz, Matusik, Townsend, Anglin & Dushnitsky, 2017; Ewens et al., 2018).

Seed-stage investors face significant uncertainty. Startups at that early stage usually have little traction on key business facets, e.g., technological viability, product-market fit, and business-model feasibility. It follows that investment decisions are plagued with intense uncertainty because (a) there is little or no information on multiple facets of a startup's operation, and (b) the

entrepreneurs have yet to identify, let alone mitigate the various business risks. Recently, entrepreneurship scholars recognized the unique challenges associated with seed-stage startups and began exploring which factors shape investors' decisions (see review in the next section).

We join this conversation and the investigation of investment under uncertainty. To that end, we focus on startups graduating from early-stage accelerators. The accelerator setting acts as an ideal window on resource mobilization at the earliest phases (Clough et al., 2019). Specifically, accelerators are fixed-term, cohort-based education programs for budding entrepreneurs. A program culminates with a Demo Day, where prospective investors observe pitches by graduating startups. The genesis of the phenomenon is attributed to the launch of Y-Combinator in 2005, and more broadly, to the proliferation of seed-stage startups (Ewens et al., 2018). A decade later, a third of all US startups that progressed to series A had graduated from an accelerator. Nowadays, hundreds of seed-stage startups graduate from dozens of accelerators across the U.S. and the world (Cohen, Fehder, Hochberg & Murray, 2019; Drover et al., 2017; Yu, 2020).

To understand the decision to invest in seed-stage startups, we take the following steps. First, we review the entrepreneurship literature on investment decisions. Next, we proceed to introduce a novel mechanism based on the affect-as-information theory (Schwarz, 2012). The subsequent section integrates the discussion and derives testable hypotheses.

Investment Decisions: Investment Drivers in the Entrepreneurship Literature

Entrepreneurship literature has studied the factors driving investment decisions. There are two dominant streams of work; one focusing on the focal startup and its underlying characteristics, and another concerned with investors.

The first stream focuses on startup characteristics. Early works documented the criteria that guide investors' decisions. For example, Tyebjee & Bruno (1984) identify four investment criteria:

product viability, market size and potential, competition, and founders' quality. Macmillan et al. (1985) expand the list to six criteria and find that founding-team characteristics are key to future success. Their work was replicated across different geographies: Canada (Knight, 1994), Europe (Riquelme, 1994), and Japan (Ray & Turpin, 1991). Related works identify a host of cues that investors view favorably; e.g., the attainment of patents (Hsu & Ziedonis, 2013), affiliation with industry players (Stuart, Hoang & Hybels, 1999) and trusted parties (Shane & Cable, 2002), or founders' professional and educational background (Burton, Sørensen & Beckman, 2002).

This stream of work views investment decisions as a function of startups' characteristics. It documents a set of objective criteria employed by investors. Variation in investment patterns, therefore, is driven by heterogeneity in information about the startups. A corollary observation is that collecting more information about a startup, to the extent available, should yield better predictions regarding its funding success. The discussion also underscores the challenge associated with seed-stage investment. That is because startups at that stage have little to show in the way of a product, patent, prominent industry partner, or paying customer.

The second stream of work highlights the role of investors' traits as drivers of investment decisions. Prior work finds persistent differences in investors' tastes, documenting discrimination based on founder's ethnicity (Bengtsson & Hsu, 2015; Pope & Sydnor, 2011), gender (Brooks et al., 2014; Coleman & Robb, 2009; Vismara & Benaroio, 2017), as well as a systematic pattern of homophily in investment decisions (e.g., Franke et al., 2008; Vissa, 2011). Another group of studies finds investors' decisions are guided by feelings integral to the investment task. Namely, investment decisions can be sensitive to entrepreneurs' affective state (Milovac & Sanchez-Burks, 2014); e.g., increasing as entrepreneurs displayed passion (Cardon, Mitteness & Sudek, 2017), or when entrepreneurs introduce their venture with joy (Jiang et al, 2019). Moreover, the impact of

such displayed affect is a function of investors' traits; e.g., older investors with a mentor-orientated personality are more likely to react to entrepreneurial passion (Mitteness, Sudek & Cardon, 2012). Along similar lines, investors 'gut feeling' drives their decision to fund early-stage startups; Huang & Pearce (2015) find that veteran investors rely on their integral, experience-based schema, which they have developed over prior investments.

The works in this stream suggest that investment decisions follow investors' traits. It is heterogeneity in investors' traits that drives the investment patterns we observe. A corollary follows. For a focal investor, past investments reflect their accumulated experiences and decision style, and thus offer guidance about future decisions (Epstein & O'Brien, 1985). These insights help to explain seed-stage investments, i.e., the role of experience-honed 'gut feeling.'

In summary, the entrepreneurship literature has a long tradition of studying investments in small and medium businesses. It finds that investment decisions are a function of the members of the investor-startup pair. Some studies focus on the characteristics of the latter (i.e., heterogeneity in startup characteristics); others investigate the traits of the former (i.e., heterogeneity in investors' traits), while, more recently, some studies focus on the pair (Claes & Vissa, 2020; Huang & Knight, 2017). In parallel, the broader entrepreneurship literature has seen recent calls to embrace affect-based explanations. For example, Baron (2008) notes that affect can tip the balance towards specific actions, especially in contexts involving high uncertainty and unpredictability.

Investment Decisions: The Role of Incidental Contextual Factors

We propose that, in the presence of substantial uncertainty, investment decisions are affected by incidental contextual factors, e.g., a daily change in sunshine. Although such factors are incidental and do not carry information about the task at hand (i.e., the startup), they affect mood and can ultimately shape investors' decisions. Our focus on contextual factors, therefore,

complements extant work that focuses on factors within the investor-startup pair. We shift attention from the characteristics of a startup or the traits of an investor to study the context in which the pair interact.

To that end, we leverage insights on decisions under uncertainty from behavioral economics and social psychology (Loewenstein & Lerner, 2003), and specifically the mechanisms delineated by affect-as-information theory (Clore & Schwarz, 1983).[4] The theory draws on the distinction between 'integral' and 'incidental' feelings (Bodenhausen, 1993; Rick & Loewenstein, 2008). The former describes feelings related to the focal task; for instance, an investor may have a positive gut feeling about the entrepreneur. In contrast, incidental feelings arise from sources objectively unrelated to the task at hand (Rick & Loewenstein, 2008); for instance, an investor may be in a good mood on the day they meet the entrepreneur.

A core postulate of affect-as-information theory is that the evaluation of a given decision mirrors one's feelings or mood when making the decision. The critical issue is that "*unfortunately, people are more sensitive to their feelings than to where their feelings come from*." (Schwarz, 2012:295). In other words, individuals confuse incidental and integral feelings, such that their evaluation may, in fact, be misguided by the former.[5] In their seminal study, Schwarz & Clore (1983) find that an individual's evaluation of life-long satisfaction is sensitive to the daily weather, which they explain by the fact that sunny days evoke a positive mood.[6] The theory emphasizes that cognitive processes and decision making are sensitive to the environment in which people

[4] In their literature review, Loewenstein & Lerner (2003) identify affect-as-information theory as the most well-developed approach to studying the role of emotions as information into one's decision making.

[5] Schwarz (2012) notes the distinction between feelings elicited by the object of judgment (i.e., 'integral' as per Bodenhausen's, 1993), and 'incidental' feelings that are due to some other source (e.g., weather). The former often provides valid information about a person's own response while the latter can be a source of misleading information. AAIT argues that individuals mistakenly perceive incidental feelings as being about the object of judgment.

[6] The theory argues that mood affects one's judgment through the incidental-feeling mechanism (Schwarz, 2012). Broadly speaking, mood lacks a referent, while emotions have one; hence, we say that we are angry "about" something, but "in" a bad mood. Moods may last for an extended time and are often of low intensity (Morris, 1989).

operate (Schwarz, 2012; Smith & Semin, 2004), and specifically to changes in the state of the environment (Hansen, Dechêne & Wänke, 2008; Schwarz, 2012; Shen, Jiang & Advaval, 2010). That is, judgement is sensitive to contextual factors; changes in the environment can shape people's mood and ultimately affect their judgment and decisions.

There is a large body of evidence to that effect. Schwarz (2012) reviews a number of experiments that find an evaluation of a given task can be manipulated by introducing contextual changes that are unrelated to the task yet affect one's mood. This body of evidence is consistent with the view that affect guides how we view and respond to the world (Frijda, 1988). Good mood informs us that the situation is favorable and that little monitoring and processing effort is required, whereas bad mood signals an incipient danger that necessitates careful attention and systematic analysis (Forgas, 1995; Schwarz, 1990). Along these lines, experimental work highlights the positive mood-judgment association. A positive mood is associated with loose and creative approaches that often yield positive judgment (Fiedler, 1988; Fiedler, Asbeck & Nickel, 1991; Isen, 1984, 1987), and a negative mood evokes more conservative and careful analyses that often result in negative evaluation (Forgas & Bower, 1987; Schwarz, 2012).

Decisions that involve evaluation under uncertainty are particularly sensitive to incidental contextual factors. For example, Wright and Bower (1992) manipulated participants' moods using visual cues (i.e., images) and recorded their subjective probability evaluation. The findings showed that happy participants thought positive events were more likely, and negative events were less likely, while sad participants exhibited an inverse pattern. Similarly, Nygren, Isen, Taylor and Dulin (1996) reported that participants in a positive mood overestimated probabilities of winning relative to probabilities of losing.

Beyond the laboratory, there is further evidence that affect is a salient information heuristic in the face of uncertainty (Forgas, 1995; Schwarz, Strack, Kommer & Wagner, 1987). Forgas and Moylan (1987) investigated the evaluation of uncertain, 'open-ended' issues in a large field study. On all questions, happy subjects made significantly more positive and lenient judgments than did sad subjects. Notably, mood was found to influence several highly consequential decisions, from college and medical school admissions (Redelmeier & Baxter, 2009; Simonsohn, 2007) to stock-market investments (Edmans, Garcia & Norli, 2007; Hirshleifer & Shumway, 2003).

To conclude, affect-as-information theory highlights the role of mood in decision making. Incidental changes in the environment may affect mood and inadvertently tip the balance towards specific judgments or actions. This effect is particularly strong in uncertain and unpredictable settings, such as seed-stage investments. Hence, there is an opportunity to advance our understanding of investors' decisions by incorporating this theoretical mechanism. Insights from affect-as-information theory can thus complement entrepreneurship research—which has focused on the investor-startup pair—by studying (changes to) the context in which the pair is situated.

Investment Decisions: The Sunshine Hypotheses

We hypothesize that seed-stage investment decisions are affected by incidental contextual factors. Guided by affect-as-information studies, we focus on a salient contextual factor: daily sunshine (Schwarz & Clore, 1983; Saunders, 1993; Hirshleifer & Shumway, 2003). Because a daily change in sunshine is short-lived and unrelated to startups' characteristics, it is often overlooked by practitioners and not incorporated into scholarly analyses of investment patterns. Accordingly, contextual factors have received little attention in the entrepreneurship literature to date. Yet, as the previous section suggests, there is merit to investigating the impact of contextual factors at the seed-stage where investors face intense uncertainty.

Accelerators make for an advantageous setting for our investigation. They afford a window on entrepreneurial resource mobilization at its earliest phases (Clough et al., 2019). Accelerator graduates are early-stage startups that exhibit high uncertainty. Investors meet the startups and contemplate investments during a pre-scheduled event, Demo Day. Hence, our hypotheses explore whether funding decisions are susceptible to incidental contextual changes on that day.

Demo Day is a pitching event where entrepreneurs address a selected group of investors. It marks the culmination of each participating cohort. The date of the Demo Day is announced months in advance. During the event, the graduating startups pitch to an audience of prospective investors. Some startups succeed in attracting investments, while others do not. Anecdotal evidence suggests that Demo Day is a high-profile event for accelerator participants: *"From the moment we stepped into the [accelerator program], everything was about the Demo Day."*[7] These events attract the attention of the investor community. Because it can critically influence their graduates' prospects, each accelerator carefully curates participation and extends invitations to leading investors.[8] In sum, Demo Day offers an ideal setting for studying the impact of incidental contextual factors on investment decisions.

We focus on the change in Demo Day sunshine. The difference in sunshine hours between Demo Day and the preceding day is driven by a contextual factor; the weather. Because Demo Days are scheduled in advance, the weather on the day is not subject to manipulation. Notably, it

[7] Various entrepreneurs describing Demo Day experiences. Startup Podcast, Season 2 Episode 2 (Sound Cloud).

[8] Accelerators often curate participation in their Demo Days. Anecdotal evidence includes the London-based Cylon accelerator ("*Each programme culminates in a Demo Day, when teams pitch to a curated, invite-only audience of over 150 customers and investors.* " www.cylonlab.com/what-we-offer/growth), the Paris-based Microsoft accelerator ("*Much like our first Demo Day in February 2014, over 200 attendees spent the day in Paris with our young companies, including 50+ investors from top funds like Accel, Index, Balderton, DFJ, Hoxton, Kima, Jaina, 360 Capital, Partech, and more.*" https://startups.microsoft.com/en-us/blog/satya-nadella-shares-the-stage-with-8-startups-at-paris-demo-day), and the Berlin-based Startupbootcamp ("*The room was filled to capacity… including high profile investors from Index Ventures, Hack FWD, Connect Ventures, and Point Nine…* www.startupbootcamp.org/blog/2012/12/berlin-investor-demo-day).

is an incidental change that is unrelated to the task of evaluating a given startup. That is to say, an increase in Demo Day sunshine does not impact the innate quality of the startup, nor does it reveal any information about its economic potential. Simply put, the change in sunshine does not inform investors about the prospects of success for a focal startup. This incidental factor can, however, affect investors' mood. More sunshine is associated with a better mood (De Silva, Pownall & Wolk, 2012; Eagles, 1994; Kliger et al., 2010; Kripke, 1994; Saunders, 1993; Rind, 1996). Following affect-as-information theory, such incidental mood influences how favorable prospects are viewed (Arkes, Herren & Isen, 1988; Johnson & Tversky, 1983), and the effect is especially strong where uncertainty is high (Clore, Schwarz & Conway, 1994; Forgas, 1995).

We derive hypotheses regarding the role of incidental contextual factors at the seed stage. Investors attend a Demo Day to observe pitches by nascent startups whose prospects are highly uncertain. It is a setting where contextual changes can impact important economic decisions (Hirshleifer & Shumway, 2003; Schwarz, 2012; Rick & Loewenstein, 2008). Hence, a sunnier Demo Day can have a favorable effect on investors' mood and ultimately sway their investment decisions. We contend that investment patterns are sensitive to a change in Demo Day sunshine.

> ***Hypothesis 1:*** *For a given startup graduating on a given Demo Day, the sunnier the Demo Day (i.e., when the sunshine duration is higher relative to the previous day), the greater the likelihood of raising a Demo Day round.*

We proceed to explore the moderators of the sunshine effect. Absent information about the technology or customer acceptance, investors have to rely on their subjective evaluation of the probabilities of success. Recall that mood drives one's decisions in uncertain situations where information is limited (Clore et al., 1994; Forgas, 1995; Forgas & Moylan, 1987). A positive mood is associated with over-estimating the probability of success, while a negative mood is associated with over-estimation of failure (Wright & Bower, 1992; Nygren et al., 1996). Along these lines,

good mood is associated with less critical information processing (Petty, Gleicher & Baker, 1991; Schwarz, 1990; Sinclair & Mark, 1995), and makes individuals more receptive to weak arguments (Schwarz, Bless & Bohner, 1991; Mackie & Worth, 1991). Notably, the impact of mood decreases as other relevant information becomes accessible (Schwarz, 2012).

Guided by these insights, we explore two factors that moderate the association between Demo Day sunshine and investment decisions. The moderators focus on the level of uncertainty that investors face, which we capture using startups' characteristics. Specifically, we consider startups' maturity and the background of the founders. A significant research-design advantage of the next two hypotheses is that they exploit variation within a Demo Day but across startups. On a given Demo Day, for example, there may be some graduating startups that are more advanced than others. From the investors' perspective, the less advanced startups are associated with more substantial uncertainty. It is for those startups that changes in daily sunshine (and ensuing mood) will have a greater impact on investors' decisions.

Consider the age and maturity of a focal startup. An early-stage startup exhibits intense uncertainty because it usually has no track record across multiple business dimensions. An investor has to evaluate the probability of successfully developing the technology, the chances of reaching product-market fit, business-model feasibility, and so on. Because the evaluation of subjective probabilities is sensitive to one's mood, we expect that investment decisions will be sensitive to contextual factors. An incidental increase (decrease) in sunshine hours may drive investors to over- (under-) estimate the probabilities of the focal startup delivering on each business dimension.

In contrast, mature startups are more advanced and can share information about financial traction or present hard data about products and sales (Huang & Pearce, 2015; Zacharakis & Meyer, 1998). Hence, the more mature a startup is, the lower the level of uncertainty associated

with it (Gompers, 1996; Ewens et al., 2018). This is not to say that investors will be inclined to fund every mature startup; indeed, they will evaluate the data in hand and decide to forego specific investment opportunities. The key point is that, with mature startups, there are fewer facets of the business that require subjective evaluation. Hence, the assessment of these startups is less sensitive to incidental mood. We thus expect the effect of sunshine on a startup's fundraising success to diminish as a function of startup maturity.

> ***Hypothesis 2:*** *Startup maturity will moderate the positive association between sunnier Demo Day and subsequent funding success. The effect will be stronger for younger startups compared to more mature ones.*

Finally, we consider the moderating role of founders' human capital. At the early stage, the main asset of a startup is the human capital of its founders (Huang & Pearce, 2015; Kaplan, Sensoy & Strömberg, 2009). Extant work explores the probability of startup success as a function of entrepreneurs' human capital. It reports a positive and significant association with various founders' characteristics, including educational background (Colombo & Grilli, 2005; Robinson & Sexton, 1994) and entrepreneurial experience (Gompers, Kovner, Lerner & Scharfenstein, 2008; Hsu, 2007). Accordingly, we conjecture that individuals possess substantial human capital if they have attained a post-graduate degree or have had a prior entrepreneurial experience.

Experienced founders with high human capital are viewed favorably and usually secure the necessary funding (MacMillan et al., 1985; Hsu, 2007). However, many entrepreneurs lack prior founding experience and possess limited human capital. Investors would be cautious of the latter founders and perceive their prospects to be highly uncertain. The decision to invest, therefore, rests on investors' subjective assessment of the founders and their likelihood of success. Our discussion of prior work suggests that individuals' subjective assessments are sensitive to their mood (Wright

& Bower, 1992; Nygren et al., 1996). Therefore, we expect that the effect of daily changes in sunshine will be more substantial where investors evaluate founders with limited human capital.

> ***Hypothesis 3:*** *Founders' human capital will moderate the positive association between sunnier Demo Day and subsequent funding success. The effect will be stronger for founders with limited human capital compared to those who possess substantial human capital.*

METHODOLOGY

We employ the two main approaches in the affect-as-information literature: archival data analyses (Hirshleifer & Shumway, 2003) and experiments (Schwarz & Clore, 1983). This is a common practice among recent entrepreneurship and management studies (Hekman, Johnson, Foo & Yang, 2017; Huang, Joshi, Wakslak & Wu, 2020; Jung, Vissa, & Pich, 2017). It offers the advantage of analyzing data from naturally occurring phenomenon as it is observed in the field, and supplementing those insights with a controlled laboratory analysis to verify the causal process and underlying mechanism. Study 1 analyses archival data and tests the hypothesized sunshine-investment association and its moderators. Study 2 reports an experiment that captures the role of investors' mood as a mediator of the sunshine-investment association. A discussion of the relative contributions of each method concludes.

Study 1: Analysis of Archival Data

The Setting. We study startups graduating from European accelerators. European cities host some of the most vibrant startup and accelerator landscapes outside the United States, with London widely considered to be the epicenter. The first major European accelerator, London-based Seedcamp, graduated its inaugural cohort in 2008, about two years after Y-Combinator.

The accelerator phenomenon is an ideal setting for studying seed-stage investments (Clough et al., 2019). We exploit the fact that each graduating cohort culminates in a Demo Day

that is scheduled months in advance. Demo Day occurs on a predetermined date and enables us, the researchers, to observe and test the effect of contextual factors on the day.

The Data. We created a proprietary dataset of startups graduating from European accelerators by (i) combining data from multiple venture capital (VC) databases; and (ii) hand-collecting data from primary and secondary sources. Our efforts yielded data on 1,335 startups. The startups pitched during 171 Demo Day events in about a dozen major cities across Europe. We undertook the following steps to construct the dataset.

First, we searched for 'likely accelerators' and identified about 55 European entities, based on a thorough search through major technology and VC-focused resources (e.g., TechCrunch). We were mindful that several of these entities interchangeably identified themselves as 'accelerators' and 'incubators'; hence, we assessed each entity against five criteria.[9] Out of the 55 entities, 24 were either (a) misclassified as accelerators while being co-working spaces or incubators; (b) no longer active; (c) recently launched with no graduates as yet; or (d) did not have documented Demo Day dates. Therefore, we focused on 31 accelerators.

Second, data on the accelerators and the identities of startups that graduated from their programs were collected from accelerators' websites. Third, investment information was collected from Crunchbase and Beauhurst. The Crunchbase database contains detailed information on public and private companies on a global scale. It includes information on investments and funding information, founding members, and more. Crunchbase data is used in the literature (e.g., Cohen, Bingham & Hallen, 2019; Hochberg, 2016). The data was triangulated with Beauhurst, a research

[9] An accelerator can be characterized by five attributes (Cohen, 2013): (i) its business-support programs are preceded by a public call for applications, followed by a competitive selection process; (ii) the contract between the accelerator and a participating startup (often) involves the former purchasing an equity stake in the latter; (iii) in return, the startup receives free or subsidized workspace, sometimes a stipend for the founder(s), and mentorship by the accelerator team and panel of mentors; (iv) entries and exits are cohort-based, rather than individual startup-based, with pre-scheduled start and graduation dates; and (v) cohorts culminate in a single-day investor roadshow event, the Demo Day, where entrepreneurs make short pitches to a room full of investors.

organization that maintains a VC database focusing on entrepreneurial organizations in the U.K.. Finally, we used data from primary research to validate the accuracy and expand coverage of our dataset. To that end, we sent email questionnaires to the managers of accelerators in our sample. The responses enabled us to validate data for accelerators and the graduating startups.

Variables and econometric strategy. The unit of analysis is the startup. The dependent variable, *Demo Day Funding*, takes a value of one if a startup secures a Demo Day funding round and zero otherwise. We follow past practice and consider as a Demo Day round any financing round recorded within a 90-day period of the Demo Day date (Lerner, 1994; Guler, 2007).

Main independent variable: Sunnier. The main independent variable captures the change in sunshine from the day before Demo Day to the day of Demo Day. The daily change in sunshine is a stochastic variable that takes random values.[10] Our approach is informed by previous affect-as-information studies and follows a key feature of human perception: individuals are attuned not to absolute levels but rather to changes from a reference point (Kahneman & Miller, 1986; Kahneman & Tversky, 1979).[11] The variable *Sunnier* is defined as the difference between the number of hours of actual sunshine realized on a Demo Day and that on the previous day. To calculate the measure, we use historical weather data from Weather Online (www.weatheronlnie.co.uk). We validated the data against the National Oceanic & Atmospheric

[10] Daily change in sunshine is a stochastic variable (Hirshleifer & Shumway, 2003; Simonsohn, 2007). It is distinct from the daily change in daylight, which is a deterministic variable. That is because daylight length is an astronomical constant given by the period of the year (e.g., longest on the date of summer solstice); such that a change in daylight between one day and the previous day is deterministic. In contrast, the daily change in sunshine is a function of realized weather on specific dates (i.e., it is affected by daylight length as well as atmospheric factors such as cloud cover). It is a stochastic variable that takes random values.

[11] Kahneman and Tversky (1979) advance that humans are attuned to the evaluation of changes or differences rather than to the evaluation of absolute magnitudes. The AAIT literature focused on the impact of contextual changes. The work is often based on experimental methodology, which as Schwarz (2011) noted, inherently involves a change from baseline as part of the experiment. Archival studies similarly focus on daily changes. For example, Hirshleifer & Shumway's (2003) study of daily stock-market returns focuses not on the absolute level of sunshine on the day, but rather on the daily change compared to a reference point.

Administration (the U.S. federal agency collecting weather data globally; Hirshleifer & Shumway, 2003) wherever available. The data allows us to calculate sunshine hours with a precision of up to a quarter of an hour, or 15 minutes.

Figure 2 illustrates that daily change in sunshine is a stochastic variable. It plots realized November sunshine in London for two years; 2008 and 2015. The second of November saw as little as 0.5 hours of sunshine in 2008, but as much as 1.75 hours in 2015. It is possible to experience zero hours of sunshine even in the summertime if the sky is overcast or there is fog. Our measure is distinct from the daily change in the length of daylight, which follows a deterministic pattern, increasing from the winter to the summer solstice and decreasing afterward.

***** Insert Figure 2 about here *****

Moderating variables: Startup Maturity. A startup's age is a proxy of its maturity (Gompers, 1996). The variable *Startup Maturity* is the time elapsed (in months) between the startup's founding date and its Demo Day date. It is a continuous variable at the startup-level. All else being equal, the younger a startup, the greater the level of uncertainty associated with it.

Entrepreneurial Human Capital. We use information about entrepreneurial experience and educational attainment as a proxy for founders' human capital. First, we collected the founders' names and basic professional profiles from Beauhurst and Crunchbase. We then complemented the data with information from the founders' LinkedIn accounts. Each founder scores one if they have prior entrepreneurial experience, hold a master's degree or higher, and zero else (Hallen, 2008). The variable *Human Capital* is the overall score calculated as the mean value across a startup's founders. It is a startup-level continuous variable that takes values between zero and one.

Control variables. We include *DD_Sunshine*, the absolute realized sunshine hours on a Demo Day itself. Note that this variable is distinct from the independent variable, *Sunnier*, which

is an inter-day change in sunshine levels. Put another way, *DD_Sunshine* reports the absolute level of sunshine on a given day, while *Sunnier* reports the daily change. We also incorporate appropriate covariates, in line with VC literature. First, we control for several startup-specific characteristics. These include demographic characteristics of startup founders, such as the average age of the team (*Team Avg. Age)*, and whether it has female participation *(Team Has Female).* The variable *Prior Fundraising* captures the total amount of capital raised by a startup before entering the accelerator. We introduce city fixed effects to control for the location of the startup and also create a vector of industry fixed effects based on the startup's industry.

In addition, we control for accelerator and cohort characteristics. To control for accelerator-specific heterogeneity, we include accelerator fixed effects. Such issues could include, but are not limited to, the quality of the education and skills the accelerator offers, as well as the breadth and strength of its mentor community. Furthermore, we include controls for various cohort-level characteristics in order to account for differences across various cohorts of the same accelerator. *Cohort size* captures the number of startups participating in a focal cohort. We also include cohort averages of startup maturity and prior fundraising amount.

Regression models. Given that the dependent variable is a binary variable, we use a binary logistic regression specification. This specification is commonly used in studies of entrepreneurial resource acquisition (Eggers & Song, 2015; Plummer, Allison & Connelly, 2016; Vissa, 2011). The errors were clustered at the cohort level. The findings are robust to other non-linear estimation methodology (probit) and Linear Probability Model OLS estimations.

Results. Tables 1 and 2 report key descriptive statistics and pairwise correlations, respectively. The mean value of the dependent variable, *Demo Day Funding*, indicates that 17% of startups in our sample secured funding shortly after their Demo Day pitches. The main

independent variable, *Sunnier*, has a median and mean value of zero and a standard deviation of 4.2 hours. It is in line with the theoretical discussion that the variation in sunshine from one day to another represents an incidental contextual factor that is random in nature. The median (mean) age of startups at the time of graduation is about 15 months (22 months). The founding teams vary in their entrepreneurial human capital, with a median (mean) score of 0.00 (0.19), indicating that the majority of them have limited background in terms of prior entrepreneurial and educational experiences. Finally, the number of graduates varies across accelerator cohorts, with a median (mean) cohort size of 12 (20) startups.

***** Insert Tables 1, 2 and 3 about here *****

Table 3 presents the logit regression results. Model 1 reports a baseline regression, where we regress the likelihood of a Demo Day round on a vector of controls. Model 2 adds the independent variable, *Sunnier*. The coefficient is statistically significant ($p < 0.01$). It is also of substantial economic impact: an increase of one standard deviation in the daily change of Demo Day sunshine hours is associated with an increase of 3.6% in the likelihood of funding.[12] It is a noteworthy increase, given that the population average of *Demo Day Funding* is 17%. The result supports Hypothesis 1: an incidental factor (i.e., a Demo Day experiences more sunshine than the previous day) is associated with a meaningful impact on investment patterns. Model 3 replicates Model 2 while excluding the control for absolute Demo Day sunshine. The results are robust to this specification; *Sunnier* remains positive and statistically significant ($p < 0.04$).

Models 4 and 5 examine the moderating effects discussed in Hypotheses 2 and 3, respectively. Finally, Model 6 presents the full specification, including both moderators. We are mindful that, in a logistic specification, the marginal change in the value of the dependent variable

[12] Economic impact is calculated as the marginal effect where the value of *Sunnier* increases by one standard deviation (4.2 hours) from its mean value (zero), while holding all other variables at their mean.

depends not only on the coefficient of the interaction term but also on the levels of other covariates (Hoetker, 2007). Per extant work, we report a graphical representation of the interaction effect (Haas, Criscuolo & George, 2015; Criscuolo, Dahlander, Grohsjean & Salter, 2017; Zelner, 2009).

Model 4 explores the sensitivity of the sunshine effect to startups' maturity. To that end, we interact the variable *Startup_Age* with *Sunnier*. As for the coefficients on the main effects, the former remains negative and statistically insignificant ($p < 0.62$), while the latter is positive and significant ($P < 0.04$). The coefficient on the interaction term is positive yet not statistically significant at conventional levels ($p < 0.77$).

As noted above, the economic magnitude cannot be inferred from standalone coefficients in logit models. We proceed with a graphical interpretation of the moderator (Figure 3). Panel A illustrates the likelihood of funding as a function of startup age. The solid line represents Demo Days that experienced no change in sunshine (*Sunnier* at its median value of 0.002 hours). The dashed line plots the likelihood of funding for startups graduating on Demo Days that experienced more sunshine than the previous day (*Sunnier* at its median plus one standard deviation; or 4.2 hours). The lines exhibit a gentle upward slope and, notably, the dashed line is above the solid line.

Panel B of Figure 3 reports the net effect of 'sunnier' Demo Days as a function of the startup age (think of it as subtracting the dashed line from the solid line in Panel A). The line increases monotonically. The dotted part of the line represents values that are statistically significant ($P < 0.1$). It shows the impact of 'sunnier' Demo Day is statistically significant for startups aged 50 months or less, which accounts for about 80% of the sample. The figure suggests an important boundary condition of the sunshine effect: it is observed predominantly for younger startups characterized by high uncertainty.

Model 5 investigates the moderating effect of founders' human capital. The coefficient for *Sunnier* is positive and statistically significant ($P < 0.01$). The coefficients for *Human Capital* and the interaction term are not statistically significant at conventional levels ($P < 0.31$ and $P < 0.67$, respectively). Panel A of Figure 6 plots the interaction between *Sunnier* and *Human Capital*. The solid line denotes Demo Days that experienced no change in sunshine. The dashed line represents Demo Days that experienced more sunshine than the previous day (*Sunnier* at its median plus one standard deviation). Notably, the likelihood of funding is higher for the 'sunnier' Demo Days. Panel B reports the net effect (i.e., the gap between the two lines). It illustrates how the impact of sunshine changes as a function of a startup's human capital. The dotted part shows the difference is statistically significant for startups where the founders possess lower levels of human capital (accounting for about two-thirds of the startups in our sample). In other words, the stimulating effect of Demo Day sunshine is observed where uncertainty is high. The figure underscores another boundary condition; the sunshine effect dissipates for the more experienced and educated founders.

***** Insert Figures 3 and 4 about here *****

The findings are robust to a number of alternative specifications. First, we are aware that non-linear models, such as fixed effects logit, are susceptible to the incidental parameter problem. Hence, we estimate the models using Linear Probability Model OLS regressions (Vanacker, Forbes, Knockaert, Manigart, 2020; Zhelyazkov and Tatarynowicz, 2020). The LPM results appear in the online appendix (Table A1). The main effect of *Sunnier* is positive and significant (Model A1-1). The interactions with *Startup Age* and *Human Capital* are not statistically significant at traditional levels (see Models A1-2 and A1-5, respectively). In line with our hypotheses, supplementary split-sample analysis reveals that the *Sunnier* effect is positive and statistically significant for younger ventures (Model A1-3) and founders with limited human

capital (Model A1-6), but not for mature ventures or those with high human capital (Models A1-4 and A1-&, respectively). Second, we ascertain that the findings are driven by sunshine changes on the day of Demo Day. To that end, we investigate the impact of daily sunshine changes during the five days before and after the Demo Day. The analyses for leading days appear in Tables A2 and A3 (replicating Models 2 and 3 of Table 3, respectively), and lagging days analysis appears in Tables A4 and A5 (replicating Models 2 and 3, respectively). Looking at the full model in each table (Models A*x*-6), we note that the coefficient for Demo Day *Sunnier* is significant and higher than the other coefficients. Finally, we report splined models for *Sunnier* (Table A6).

To conclude, analyses of investment patterns across 1,335 European startups find evidence of a positive sunshine-investment association. The economic impact is noteworthy: the likelihood of Demo Day investment increases by 3.6%, which is about 21% of the sample average. Supplementary analyses further point to two moderators: the positive association is stronger for younger startups and founders with lower human capital. In line with the theoretical mechanism, the sunshine-investment association is greatest when uncertainty is high.

Study 2: Investment Decision Experiment

To further tease out the mechanism underlying the sunshine-investment association, we conducted an experiment. The advantage of this methodology is twofold: (a) it allows us not only to document the sunshine-investment association but also to test for the theoretical mechanism (sunshine-mood-investment relationship); and (b) it controls for startup heterogeneity, holding the startup constant and testing the impact of contextual factors through random assignment.

Experimental design. We present a randomized, between-subjects experiment. The experiment explores the impact of incidental contextual factors in the setting of early-stage investment. As with the archival study, we study investment opportunities pitched during Demo

Day. We followed Huang & Pearce (2015) and utilized recordings of entrepreneurs' pitches during a recent Demo Day at a leading West Coast accelerator.

In selecting which pitch to use, we took two steps. First, we identified all the pitches taking place during a 'sunnier' Demo Day to be aware of any effect on the pitching entrepreneur. Second, among these pitches, we selected one that successfully secured a funding round shortly after Demo Day. Recall that our objective is to explore the effect of contextual changes on investors' decisions. By selecting a successful pitch, our participants are more likely to propose an investment.

We sourced participants through a participant-panel organization, Prolific Academic, with strengths in recruiting participants for academic research (Peer, Brandimarte, Samat & Acquisti, 2017; Miron-Spektor, Ingram, Keller, Smith & Lewis, 2018). The Prolific platform is used in recent experiments of early-stage investment decisions (Brooks et al., 2014; Kanze, Huang, Conley & Higgins, 2018; van Balen, Tarakci & Sood, 2018). Participants were pre-screened for their overall profile, as well as prior investment experience.

The experimental manipulation — a mood induction — is introduced upfront where participants are presented with the task of assessing a Demo Day pitch. The opening page consists of a description of the weather and invites the participant to view and evaluate the pitch. The actual manipulation consists of a combination of a visual and a textual stimulus. Extant work suggests that a story or description with visual and textual cues is a highly effective mood-inducement procedure in general (Westermann, Spies, Stahl & Hesse, 1996; Verheyen & Göritz, 2009). Weather description, in particular, has been used in the past (Rind, 1996; Rind & Strohmetz, 2001).

Accordingly, our experimental manipulation utilizes visual and textual cues of the weather. We randomly assign participants across two scenarios, which appear on the opening page of the survey instrument (see Figure 5). The first scenario consists of a page with two images of sunny

landscapes of San Francisco: a view of the Golden Gate, and a hilltop panorama of the city. On the same page, the following textual cue appears: "Imagine today is a sunny day. Yesterday's clouds are nowhere to be seen. We would like to ask you a few simple questions. Would you like to proceed?" The second scenario presents a page with two cloudy images of San Francisco. The images are from the same vista point (i.e., the Golden Gate and a hilltop panorama), and the only difference is that the skies are cloudy. The textual cue on the page reads: "Imagine today is a cloudy day. Yesterday's sun is nowhere to be seen. We would like to ask you a few simple questions. Would you like to proceed?"

To capture participants' mood, we administered the Positive And Negative Affect Schedule (PANAS) questionnaire. This is a standard psychological approach to measuring the affective state of participants (Watson, Clark & Tellegen, 1988). The approach has been widely used in the field of management (George & Zhou, 2007; Rothbard & Wilk, 2011). We followed past work and (a) used the PANAS short-form version (PANAS-SF), which consists of 10 questions (Karim, Weisz, Rehman, 2011; Rothbard & Wilk, 2011), and (b) deployed it immediately after the manipulation but before showing the pitch (Horne & Powell, 2016; Mittal & Ross, 1998; Seo & Barrett, 2007).

Experimental Procedure. The experiment progresses as follows. The first page invites participants to undertake an evaluation of an early-stage investment opportunity. The page includes the mood-inducement manipulation described above. The next page introduces the PANAS-SF questionnaire.[13] Once completed, participants move to a page containing an embedded video of the Demo Day pitch. On the following page, participants are asked about their investment decision.

[13] One concern is that the inclusion of the PANAS instrument may give rise to artificial demand effect. As a robustness test, we ran an additional experiment without the PANAS instrument. Analyses of the responses of 90 non-overlapping participants yield similar results. This gives confidence that the reported sunshine-investment associations are not an artifact of the experimental design.

In the subsequent pages, there are questions regarding socio-demographic background and an attention check (Oppenheimer, Meyvis & Davidenko, 2009).

We exclude participants who failed the manipulation and attention checks, as well as those with missing or inconsistent entries. The final pool consists of 92 participants, with about equal numbers randomly assigned to each of the two scenarios. As for key demographic attributes, 54% are male, and the average age is 34 years old. The average work experience is over 11 years, and about a third worked at a startup.

Variables. The dependent variables capture two facets of the investment decision: investment attractiveness and investment amount. The first measure captures the extent to which participants view the startup as a viable and attractive investment opportunity (Brooks et al., 2014; Huang & Pearce, 2015; Huang et al., 2020). Specifically, the variable *Attractive* measures investment attractiveness using a 7-item Likert scale, where the value one denotes a highly unattractive opportunity and seven stands for a highly attractive opportunity. The second dependent variable captures the investment amount (Kanze et al., 2018; Li, Chen, Kotha & Fisher, 2017).[14] The variable *Log(Amount)* equals the natural log of the intended investment plus one.

The independent variable denotes the sunshine manipulation. The variable *Sunnier* is a binary variable that equals 1 for the scenario where the day was described to be sunnier than the previous day, and 0 otherwise. The mediation variable, *Mood*, reports mood valence based on participants' scores on the PANAS-SF instrument (Watson et al., 1988; Rothbard & Wilk, 2011).

Analytic Approach. The experiment allows us to document the correlation between sunshine and investors' decisions and further test whether investors' mood mediates the

[14] Prior work captured investment decision using a variety of measures. They range from a binary "would / would not invest" (Chen et al., 2009), a Likert scale of the likelihood of investment (Huang et al., 2020), to a nominal investment amount (Kanze et al., 2018; Li et al., 2017). Following Huang & Pearce (2015), we asked respondents to report the intended investment amountusing a sliding scale with dollar amounts ranging from $0 to over $20,000.

relationship. We report three mediation tests that are common in the management and entrepreneurship literature. The first includes a three-step mediation regression analysis (Baron & Kenny, 1986; Chen et al., 2009; Krause, Whitler, and Semadeni, 2014, Hekman, Johnson, Foo and Yang, 2017; Shantz, Kistruck, Pacheco, and Webb, 2020); (1) estimating *Sunnier* as a predictor of investors' decisions; (2) estimating *Sunnier* as a predictor of investors' mood valance; and (3) estimating a full specification, including both *Sunnier* and *Mood* as predictors of investors' decision. Mediation is possible if steps 1 and 2 yield significant results. Step 3 determines whether it is a full or partial mediation or none at all; i.e., *Mood* is considered a full mediator if only *Mood* is significant and *Sunnier* is not.[15] Per prior work (e.g., Hekman et al., 2017), we complement this approach with two formal tests of the mediation statistical significance; a Sobel test and a bootstrap mediation analysis. The Sobel test (Sobel, 1982) assesses whether the variance in the dependent variable that is explained by *Sunnier* has been significantly reduced after the inclusion of the mediator, *Mood*. Because the Sobel test uses a normal approximation, which presumes a symmetric distribution, it may result in a bias. Thus, a third approach for testing the indirect mediation effect is bootstrapping (Preacher & Hayes, 2008). It is a non-parametric method based on resampling with replacement. Bootstrapping generates a sampling distribution used to determine a confidence interval. If zero is not in the interval, we can be confident that the indirect effect is different from zero.

Results. In line with our predictions, the findings show more favorable investment decisions under the sunnier condition. Specifically, the level of attractiveness is higher in the sunnier condition with *Attractive* values as follows: sunnier (M = 5.1, SD = 1.6), not-sunnier (M = 4.3, SD = 1.4), t = 2.4, p = 0.02. A similar result is documented for the investment amount with

[15] *Mood* is considered a partial mediator of investors' decision if both effects (sunshine and mood) remain significant. There is no mediation if the reverse holds: *Mood* is insignificant and *Sunnier* remains statistically significant.

Log(Amount) values at sunnier (M = 5.7, SD = 3.2) and not-sunnier (M = 4.3, SD = 3.5), t = 2.0, p = 0.04. Finally, we observe mood valance differs across the conditions with *Mood* values; sunnier (M = 1.8, SD = 1.0) and not-sunnier (M = 1.3, SD = 1.1), t = 2.1, p = 0.03.

Next, we turn to test the mediating effect of mood. Table 4 (Panel A) reports a set of mediation tests for investors' evaluation of investment attractiveness (Models 1 through 3). Model 4A.1 regresses investment attractiveness, *Attractive*, on our indicator of sunshine manipulation, *Sunnier*. Because *Attractive* takes integer values between 1 and 7, we utilize an order probit regression. The coefficient on *Sunnier* is positive and statistically significant (p = 0.001). The experimental setting yields similar results to that of the archival analysis; we find a positive association between a sunshine stimulus and investors' evaluations of a focal investment opportunity. In Model 4A.2, we regress investors' mood valance, *Mood*, on the manipulation indicator, *Sunnier*. Because *Mood* is a continuous variable, we estimate an OLS regression. The coefficient on *Sunnier* is positive and statistically significant (p = 0.022). The results suggest the manipulation has the expected association with participants' mood.

***** Insert Table 4 about here *****

To complete the set of mediation tests, Model 4A.3 regresses *Attractiveness* on *Sunnier* and *Mood*. The coefficient on *Mood* is positive and statistically significant (p = 0.00). *Sunnier* also exhibits a positive and significant coefficient (p = 0.017). Next, we turn to test the statistical significance of the mediated effect. The Sobel test (Sobel, 1982) statistic is significant (t = 4.21, p = 0.00). To test the indirect effect of mood, we report bias-corrected results based on 1,000 bootstrapped samples. The approach does not constrain the distribution of indirect effects and is ideal because such effects often follow non-normal patterns (Preacher & Hayes, 2008). The indirect effect was 0.105 and the 95% confidence interval (LLCI: 0.094, ULCI: 0.118) did not

straddle zero, indicating that the mediating effect was significant. Taken together, these tests suggest that mood mediates the association between sunshine and investment attractiveness.

Panel B of Table 4 repeats the analyses using OLS regression across the three models. The results are robust to alternative estimation. Specifically, Model 4B.1 reports that sunshine is positively associated with investment attractiveness (p = 0.02). Model 4B.2 replicates Model 4A.2, where *Sunnier* is significantly associated with mood valence (p = 0.022). Model 4B.3 estimates the full specification and finds a positive and statistically significant coefficient for *Mood* (p = 0.00) and an insignificant coefficient for *Sunnier* (p = 0.11). The Sobel test statistic is significant (t = 3.94, p = 0.00). Finally, bias-corrected results based on 1,000 bootstrapped samples yield an indirect effect of 0.083 (95% CI; LL: 0.071, CI: 0.097), which does not straddle zero. Together, the results indicate that mood mediates the sunshine-attractiveness association.

Analyses of the second dependent variable, *Log(Amount),* are reported in Panel C of Table 4. Model 4C.1 reports OLS regression of the investment amount on the sunshine-manipulation indicator. The coefficient on *Sunnier* is positive and statistically significant (p = 0.046). Model 4C.2 replicates Model 4A.2, where *Sunnier* is significantly associated with mood valence (p = 0.022). Model 4C.3 reports the full specification, where *Log(Amount)* is regressed on both *Mood* and *Sunnier*. The *Mood* coefficient is positive and statistically significant (p = 0.018). *Sunnier* also exhibits a positive and significant coefficient (p = 0.203). The Sobel test statistic is significant (t = 4.41, p = 0.00). We further calculate bias-corrected results based on 1,000 bootstrapped samples. The indirect effect was 0.409 and the 95% confidence interval (LLCI: 0.244, ULCI: 0.576) did not straddle zero, indicating that the mediating effect was significant. Hence, the results in Panel C suggest that mood mediates the association between sunshine and investment amount.

To conclude, the experimental analyses replicate the archival findings of a positive association between Demo Day sunshine and subsequent investment decisions. Moreover, the experimental evidence suggests investors' mood mediates the positive association. These findings are in line with our hypotheses and the underlying theoretical mechanism.

Insights Across the Archival and Experimental Approaches

We employ an experiment as well as archival data to study the effects of incidental contextual factors. The strengths of one methodology can address concerns regarding the other's weaknesses. We highlight some of the key insights and benefits below.

Consider questions regarding the underlying mechanism. We study the effect of daily changes in sunshine on investors' funding decisions. Building on affect-as-information theory, we stipulate that sunshine affects mood, which in turn influences investors' decisions. One may argue that the analysis of archival data reports sunshine-investment correlations but does not capture the underlying role of investors' mood. Our thoughts on this issue are twofold. First, we point to the experimental analysis, which explicitly measures mood valence. We capture mood immediately after the manipulation but before showing the investment opportunity. We find that (a) mood is sensitive to the manipulation, and significantly (b) investment amount and attractiveness are moderated by mood. The findings are consistent with the theoretical mechanism. Second, shifting back to the archival analysis, we recognize there is no direct proxy of mood. That said, Figures 3 and 3 are indicative of the moderating role of startups' age and founders' human capital. That is, archival investment patterns suggests that the effect of mood prevails when uncertainty is high.

Consider the issue of who is affected by changes in sunshine. One may argue that daily changes also influence the founders and the quality of their pitches. The experimental design helps to addresses this issue. It holds the pitch constant and applies the manipulation only to the

participants. Thus, the experimental findings suggest that the archival patterns may arise due to the effect on the investors.[16]

Consider startup heterogeneity. One may argue that the investment patterns are driven by unobserved heterogeneity in the quality of the startups. Our thoughts on this concern are twofold. First, for this to hold true, one must assume that high-quality startups are scheduled to pitch on sunny Demo Days, while low-quality startups are not. We have no reason to believe there is merit to this assumption because Demo Days are scheduled in advance and include all the startups in the cohort. Second, the concern applies to the archival analysis, where we study over 1,300 startups that inevitably vary in quality. Again, the experimental design mitigates this concern: investors are presented with only one pitch, such that startup quality is held constant.

Finally, one may question whether an experimental study that correlates a (brief) pitch with (pledged) funding decisions generalizes to real-world investment. Our thoughts on this issue are twofold. First, the archival analyses mitigate this concern because the dependent variable explicitly captures investment consummation. Specifically, we find that changes in sunshine on Demo Day do, indeed, correlate with actual investment in the pitching startups. Second, a related advantage of the archival analysis is that it uncovers the magnitude of the effect. Not only do we provide experimental evidence that transient changes are associated with investment decisions, but we also calibrate the magnitude of the impact using a sample of hundreds of startups.

DISCUSSION AND CONCLUSION

The proliferation of seed-stage startups has led to a growing interest in resource mobilization at the earliest stages of the entrepreneurial journey. Seed investors face a uniquely challenging task of evaluating nascent startups that lack track records or information about tangible

[16] It is possible that daily sunshine changes also affects entrepreneurs. This observation remains aligned with our contribution; i.e., the fact that contextual factors outside the investor-startup pair impact seed-stage investment.

proof points. In the face of intense uncertainty, investors may be sensitive to incidental contextual factors that sway their mood and investment decisions. We find evidence to that effect in naturally occurring investment patterns and present further corroborative experimental evidence.

The key findings are as follows. First, analysis of fundraising by 1,335 startups graduating from European accelerators during 171 Demo Days reveals a systematic pattern. The likelihood of raising seed-stage funding is sensitive to contextual factors, such as a change in the level of sunshine on Demo Day. Second, we further find the 'sunnier' Demo Day effect is exacerbated with the level of uncertainty; it is stronger for nascent startups and those where founders exhibit limited human capital. Third, we supplement the analysis by experimentally inducing and measuring the role of mood. We find that the 'sunnier' effect is mediated by mood.

The results add to our understanding of seed-stage investments. We contribute to the entrepreneurship literature and pursue the call for studying early-stage resource mobilization (Clough et al., 2019; Huang, 2018). Because seed-stage investment is plagued by intense uncertainty (Ewens et al., 2018; Huang & Pearce, 2015), we leverage theoretical mechanisms identified in disciplines with a long tradition of studying decision making. Drawing on behavioral economics and feeling-as-information theory, we note that contextual factors—such as a daily change in sunshine—evoke incidental feelings that affect one's mood and judgment (Schwarz & Clore, 1983; Loewenstein & Lerner, 2003). The introduction of this theoretical mechanism offers several contributions to the entrepreneurship literature.

First, we underscore the role of incidental contextual factors at the seed stage. Our focus is on the external physical environment in which the investor-startup pair is situated. Notably, these factors are unrelated to the innate characteristics of the startup; i.e., a daily increase in sunshine does not reveal information about the intrinsic economic potential of the focal startup. To the extent

that contextual factors are unrelated to startups' characteristics, they are often overlooked by practitioners and unobservable to the academic researcher. These features explain why incidental contextual factors have received little attention in the entrepreneurship literature to date.

Second, we complement extant work and call upon scholars to juxtapose incidental contextual factors in addition to traditional factors related to the investor-startup pair. Doing so may yield a greater understanding of seed-stage funding patterns and thus contribute to the entrepreneurship literature. To see this, recall that prior studies predominantly focused on the investor-startup pair; investigating investment outcomes either as a function of startups' characteristics or investors' experiences, disposition, and biases. We join the two streams of work and focus on the context in which the pair is situated. Our explanation complements prior work not only in focus but also in the rationale for when seed-stage investments take place (Table 5).

Third, building on this, we propose that variation in funding outcomes can emerge even across a homogeneous pool of investors and startups, simply because some pairs are randomly exposed to incidental contextual factors. The implications for entrepreneurship scholars are twofold. First, our ability to explain variation in seed-stage investment patterns can be enhanced by juxtaposing contextual factors alongside startups' characteristics and investors' traits. This insight echoes work in behavioral economics, which underscores incidental contextual factors as crucial to resolving theoretical puzzles in observed decision making (Simonsohn, 2007). A second methodological implication follows. It guides scholarly efforts towards collecting data about startups and investors, as well as the context in which they are situated. Fortunately, this is a viable task nowadays as one can harness novel settings, such as accelerators (Clough et al., 2019), or take advantage of new technologies for precision recording of timing and location of human behaviors and interactions (Lederman, Fehder, Morales, Murray & Pentland, 2020).

***** Insert Table 5 about here *****

Finally, our study focuses on contextual factors as a source of incidental mood. It complements entrepreneurship studies that explore the impact of task-related mood. For example, recent work focused on the role of investors' gut feelings and showed they represent experience-based schema developed over prior investments. That is, they offer invaluable task-related information about the investment opportunity (Huang & Pearce, 2015; Maxwell & Levesque, 2011). The same cannot be said about incidental feelings and the mood they evoke, which is, by definition, unrelated to the task at hand. Affect-as-information theory explicitly reckons that incidental mood (i.e., due to contextual changes) is distinct from integral mood (e.g., investors' gut feeling). Whereas integral feelings usually provide valid, and thus invaluable, information, reliance on incidental feelings can be dysfunctional (Schwarz, 2011). Our investigation therefore complements and adds to existing insights in the entrepreneurship literature (see Table 5).

This study has implications for business practitioners. First, it calls attention to the role of contextual factors. Rather than ignoring these incidental factors, one should heed their effect. Past work analyzing real-world data has focused on the sunshine phenomenon (Hirshleifer & Shumway, 2003; Redelmeier & Baxter, 2009; Simonsohn, 2007) or the World Cup spectacle (Edmans, Garcia & Norli, 2007). There is a plethora of laboratory-based work on the informational value of incidental moods, such as those induced by physical exercise (Emerson, Dunsiger & Williams, 2018) or exposure to the smell of chocolate-chip cookies (Ditto, Pizarro, Epstein, Jacobson & MacDonald, 2006). Hence, lab-based studies offer a key insight: although the presence of transient factors introduces a level of serendipity that makes prediction difficult, these effects accrue in a foreseeable way. Second, one may proceed to build on this insight and consider its implications. While one cannot control the sun or the outcome of major soccer matches, there may

be other contextual factors to consider. For example, building on the laboratory findings, future Demo Days may operate in such a way that they affect investors' mood (e.g., choice of refreshment or the introduction of 'walking' Demo Days).

Having outlined the paper's contributions, we acknowledge its boundary conditions and limitations. First, the arguments developed in this study are calibrated to the realities of seed-stage investment and the intense uncertainty that characterizes them. This boundary condition implies that contextual factors and incidental mood need not play a similar role in the context of later-stage investment where a VC investment committee has prior knowledge of the startup. Indeed, the graphic patterns delineated in Figures 3 and 4 illustrate the boundary conditions; they show that the sunshine-investment association is attenuated as the level of uncertainty diminishes. Put differently, the affect-as-information logic need not apply beyond the seed stage. Second, we recognize this is an early effort to understand investment decisions in the context of nascent entrepreneurial resource acquisition. Our analysis captures Demo Day funding outcomes for hundreds of accelerator graduates, yet we lack detailed data regarding the investors who participated in those events. Future work could trace the movements of individual investors and thus directly map the impact of incidental contextual factors on their decisions. There is also an opportunity to examine whether the effect of daily sunshine plays out not only through the investors but also by impacting the entrepreneurs. Third, we documented the impact of daily sunshine on seed-stage investment across Europe. Future work could explore generalizability to different geographies as well as different contextual factors (e.g., choice of refreshment). Finally, on the measurement front, we have measured startup-level outcomes as a binary variable. Future work could explore alternative measures, such as pre-money valuation.

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Table 1: Summary Statistics of Key Variables (Archival Data)

Variable	Mean	Median	Std. Dev.	Min	Max
Demo Day Funding	0.17	0.0	0.37	0.0	1.0
Sunnier	0.00	0.00	4.20	-8.25	10.75
Venture Maturity (months)	22.25	14.77	18.88	0.0	119.73
Human Capital	0.19	0.00	0.29	0.0	1.0
Team avg. Age	33.16	32.0	6.26	21	72
Team incl. Female	0.21	0.0	0.41	0.0	1.0
Prior funding	158.99	0.0	826.94	0.0	12,600
DD Sunshine	3.54	2.25	3.47	0.0	13.0
Cohort size	19.60	12.0	14.70	1.0	54.0
Cohort avg. Age	22.69	22.63	9.90	4.36	79.99
Cohort prior funding	155.79	0.60	298.78	0.0	2,177.73

Table 2: Pairwise Correlation Matrix of Key Variables (Archival Data)

	1	2	3	4	5	6	7	8	9	10
1	1.0									
2	0.02	1.0								
3	0.06	0.03	1.0							
4	0.00	0.03	0.03	1.0						
5	0.03	0.02	0.18	0.11	1.0					
6	0.03	-0.00	0.01	0.04	-0.01	1.0				
7	0.00	0.07	0.14	-0.03	0.06	-0.04	1.0			
8	0.01	0.64	0.01	-0.00	0.04	0.02	0.08	1.0		
9	0.07	-0.08	0.04	-0.08	0.02	0.12	0.12	-0.13	1.0	
10	0.12	0.06	0.44	-0.00	0.14	-0.03	0.11	0.03	0.03	1.0
11	0.08	0.18	0.16	-0.02	0.09	-0.01	0.36	0.22	0.34	0.28

Variable List: 1 = Demo Day Funding, 2 = Sunnier, 3 = Venture Maturity (months), 4 = Human Capital, 5 = Team avg. age, 6 = Team incl. female, 7 = Prior funding, 8 = DD_Sunshine, 9 = Cohort size, 10 = Cohort avg. age, 11 = Cohort prior funding**.**

Table 3: Analysis of Archival Data:
Logistic Regression of the Likelihood of a Demo Day Funding Round

DV= Demo Day Funding	(1)	(2)	(3)	(4)	(5)	(6)
Sunnier	--	0.0824*	0.0473*	0.0764*	0.0855*	0.0799*
		[0.0322]	[0.0230]	[0.0382]	[0.0342]	[0.0398]
*** Venture age**	--	--	--	0.0003	--	0.000284
				[0.00103]		[0.00103]
*** Human capital**	--	--	--	--	-0.0262	-0.0263
					[0.0614]	[0.0614]
Venture age	-0.0023	-0.00248	-0.00249	-0.00252	-0.00268	-0.00272
	[0.00504]	[0.00506]	[0.00504]	[0.00507]	[0.00506]	[0.00508]
Human capital	-0.206	-0.247	-0.221	-0.248	-0.278	-0.279
	[0.272]	[0.274]	[0.273]	[0.274]	[0.275]	[0.275]
Team avg. age	0.00581	0.00641	0.00641	0.00658	0.00696	0.00713
	[0.0130]	[0.0131]	[0.0131]	[0.0131]	[0.0131]	[0.0131]
Team incl. female	-0.0129	0.00913	-0.00821	0.0138	-0.00692	-0.00224
	[0.205]	[0.207]	[0.206]	[0.207]	[0.207]	[0.208]
Prior funding	9.39E-08	9.57E-08	9.57E-08	9.38E-08	9.42E-08	9.24E-08
	[9.37e-08]	[9.38e-08]	[9.40e-08]	[9.42e-08]	[9.40e-08]	[9.44e-08]
DD Sunshine	0.00992	-0.0744	--	-0.0754	-0.0711	-0.072
	[0.0340]	[0.0474]		[0.0476]	[0.0476]	[0.0477]
Cohort size	-0.0336*	-0.0324*	-0.0325*	-0.0325*	-0.0327*	-0.0329*
	[0.0157]	[0.0157]	[0.0159]	[0.0157]	[0.0157]	[0.0157]
Cohort avg age	-0.00126	0.00394	0.00339	0.00403	0.00499	0.00506
	[0.0165]	[0.0167]	[0.0166]	[0.0167]	[0.0167]	[0.0167]
Cohort avg pr fnd	0.000	0.000	0.000	0.000	0.000	0.000
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Startup city FE	Included	Included	Included	Included	Included	Included
Startup sector FE	Included	Included	Included	Included	Included	Included
Accelerator FE	Included	Included	Included	Included	Included	Included
N	1,335	1,335	1,335	1,335	1,321	1,321

St. Dev. statistics in brackets

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Analysis of Experimental Data:
Mediation Test of the Sunshine—Mood—Investment Relationship

Panel A (Ordered probit) **DV =**	**(4A.1) Attractive**	**(4A.2) Mood**	**(4A.3) Attractive**
Sunnier	0.150 **	0.364 *	0.115 *
	[0.047]	[0.083]	[0.048]
Mood			0.106 ***
			[0.007]
Constant	1.793 ***	1.404 ***	1.963 ***
	[0.540]	[0.065]	[0.309]
N	92	92	92

Attractive is estimate using Order Probit regression (Models 1 and 3) and Mood is estimated using OLS regression (Model 2). St. Dev. statistics in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel B (OLS) **DV =**	**(4B.1) Attractive**	**(4B.2) Mood**	**(4B.3) Attractive**
Sunnier	0.165 *	0.364 *	0.134
	[0.072]	[0.083]	[0.082]
Mood			0.084 ***
			[0.010]
Constant	4.313 ***	1.404 ***	4.195 ***
	[0.201]	[0.065]	[0.201]
N	92	92	92

All the models are estimated using OLS regressions.
St. Dev. statistics in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

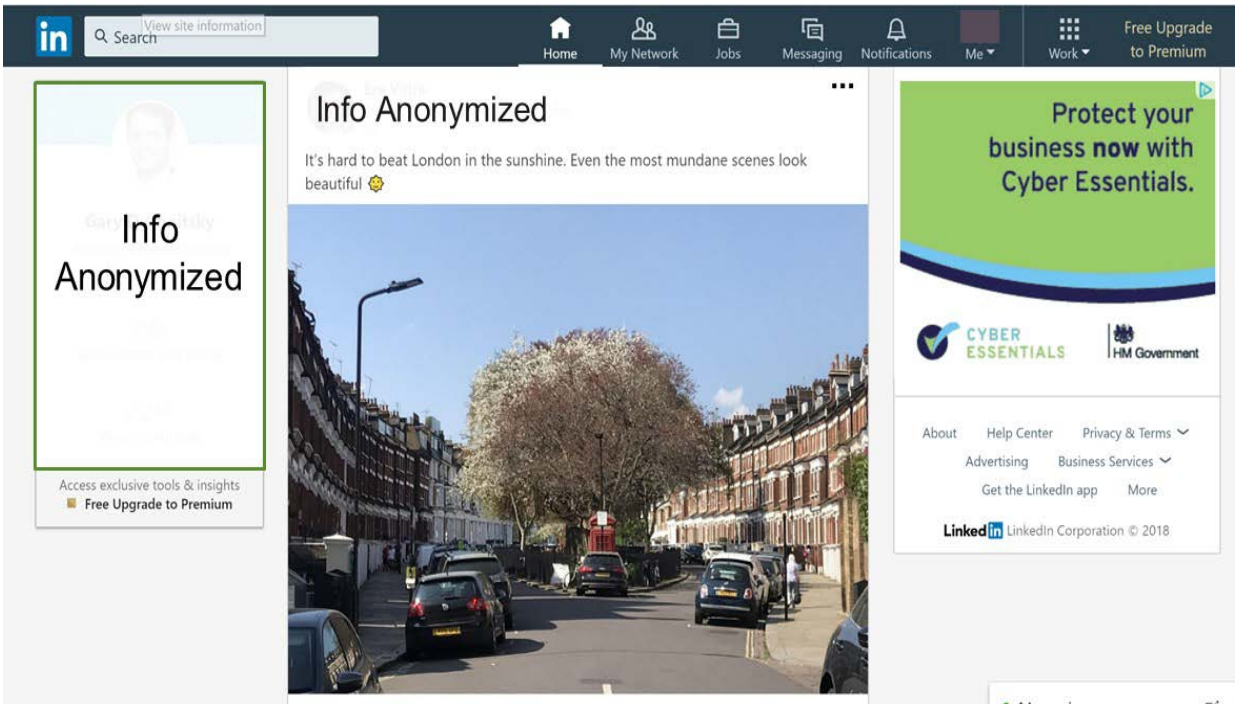
Panel C (OLS) **DV =**	**(4C.1) Log(Amount)**	**(4C.2) Mood**	**(4C.3) Log(Amount)**
Sunnier	0.996 *	0.364 *	0.847
	[0.303]	[0.083]	[0.522]
Mood			0.410 *
			[0.085]
Constant	4.498 **	1.404 ***	3.922 **
	[0.768]	[0.065]	[0.590]
N	92	92	92

All the models are estimated using OLS regressions.
St. Dev. statistics in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Investment Pattern Explanations

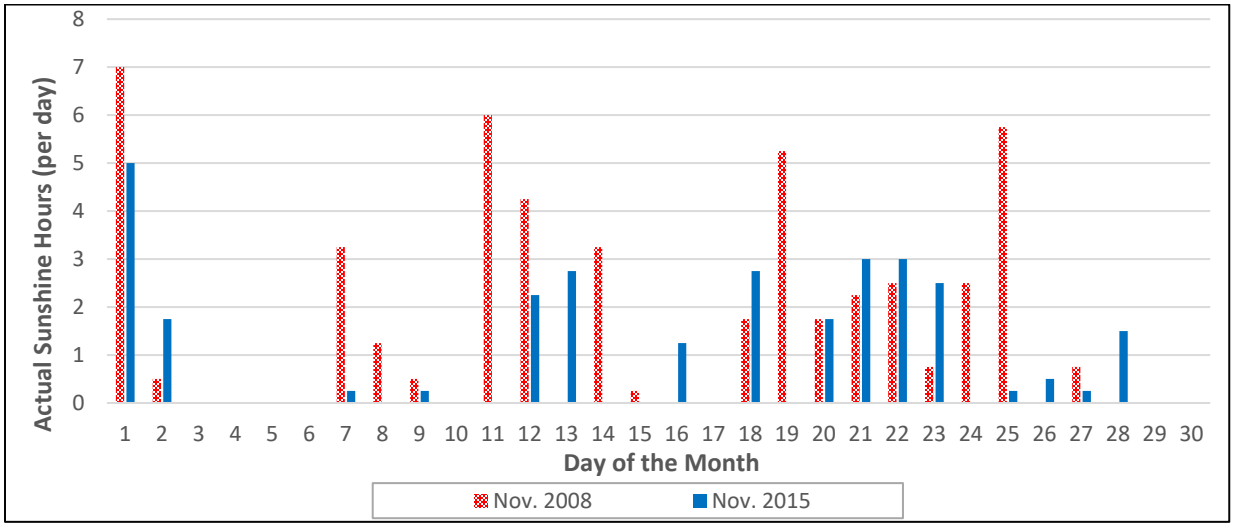
	Startup's Characteristics	Investor's Traits	Incidental Contextual Factors
Where is the focus?	• Within the investor-startup pair. • Specifically, factors associated with one facet of the pair; startup's characteristics.	• Within the investor-startup pair. • Specifically, factors associated with one facet of the pair; investor's traits.	• Outside the investor-startup pair. • Specifically, incidental contextual factors such as changes in the physical environment.
What drives investment decisions?	• Startup's characteristics. • There are several facets of the startup (e.g., market, team, competition, etc.). • Heterogeneity in startups' intrinsic quality is viewed as the root cause of variation in investment patterns.	• Investor's individual traits and cognitive style. • Note: the focus is on one facet of the investor-startup pair. • Investors vary in their cognitive style and social influences (e.g., over-confidence, ethnic and gender preferences, etc.). • Heterogeneity in investors' traits is viewed as the root cause of variation in investment patterns.	• Incidental contextual factors: (a) a contextual shock, that is (b) unrelated to the investment. • May arise in the face of high uncertainty (e.g., absent information on venture's characteristics). • A homogenous pool of investors may make different investments simply because investors are subjected to different contextual shocks at the time of investment.
How to better predict investment decision?	• More and better data about the startup is needed. • Efforts should be allocated to capturing various characteristics of the startup. • There is more traction (and hence more data) as a startup matures.	• Investor's past investments are a reflection of their cognitive style. • Efforts should be allocated to documenting past investment decisions.	• Understand the magnitude of the impact of incidental shocks. • Understand the conditions that exacerbate incidental shocks or act as boundary conditions.
Related works on resource acquisition	Burton et al., (2002); Franke et al., (2006); Hsu & Ziedonis (2013); Macmillan et al., (1985); Petty & Gruber (2011); Tyebjee & Bruno (1984).	Brooks et al., (2014); Coleman & Robb (2009); Huang & Pearce (2015); Franke et al., (2008); Guler (2007); Pope & Sydnor (2011); Vissa (2011).	The present study.

Figure 1: The Impact of Sunshine on a Prominent London-based Investor



A screen capture of a LinkedIn post by a London-based VC investor who actively finances seed-stage startups. The LinkedIn post reads: "*It's hard to beat London in the sunshine. Even the most mundane scenes look beautiful ☺*".

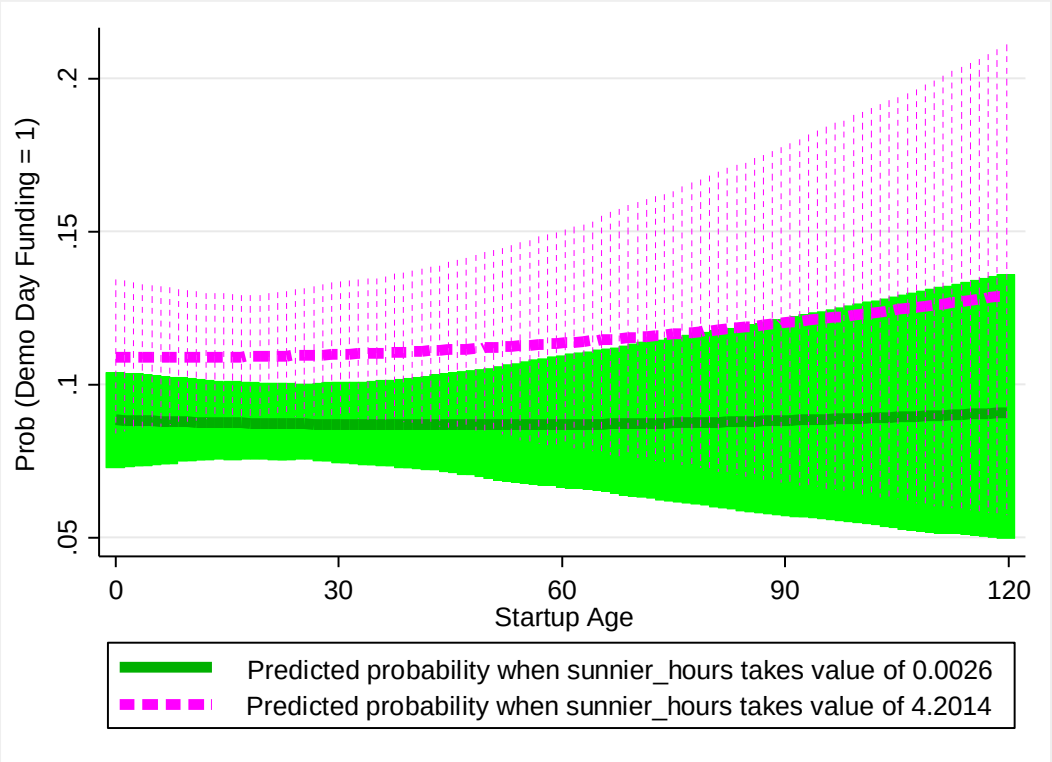
Figure 2: Realized Sunshine Hours in London: Nov. 2008 versus Nov. 2015



The Y-axis records realized amount of sunshine (in hours). The X-axis is the day of the month. Note that sunshine duration and daylight duration are quite distinct measures. Daylight duration is a function of the time of year, increasing steadily from the winter to the summer solstice and decreasing afterwards. In contrast, sunshine duration can vary daily; zero hours can be experienced even in the summertime on a day that is overcast or foggy throughout. For example, November 2 received 0.5 hours of sunshine in 2008, but 1.75 hours in 2015. The variable 'Sunnier' would take the value 0 for both dates because the preceding day (November 1 2008 as well as 2015 respectively) received more hours of sunlight.

Figure 3: Test of Hypothesis 2: The Interaction Between *Sunnier* and *Startup Age*

Panel A. Funding Likelihood for 'Sunnier' and 'Non-Sunnier' Demo Days



Panel B. Funding Likelihood: The net effect ('Sunnier' minus 'Non-Sunnier' Demo Days)

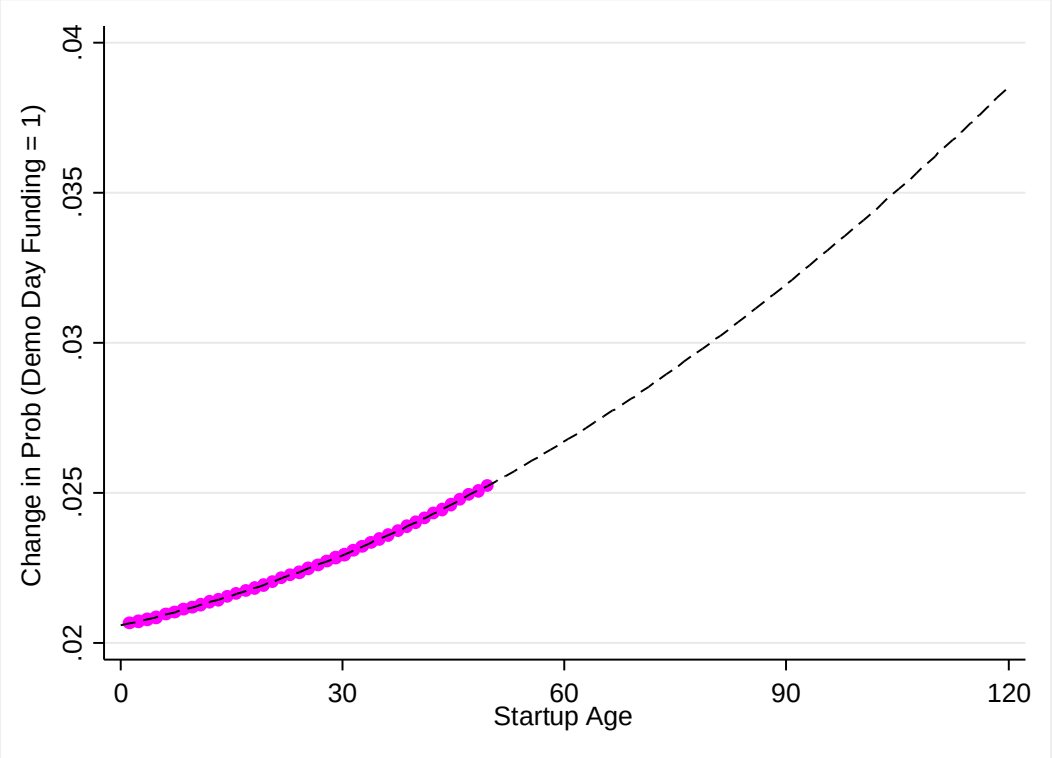
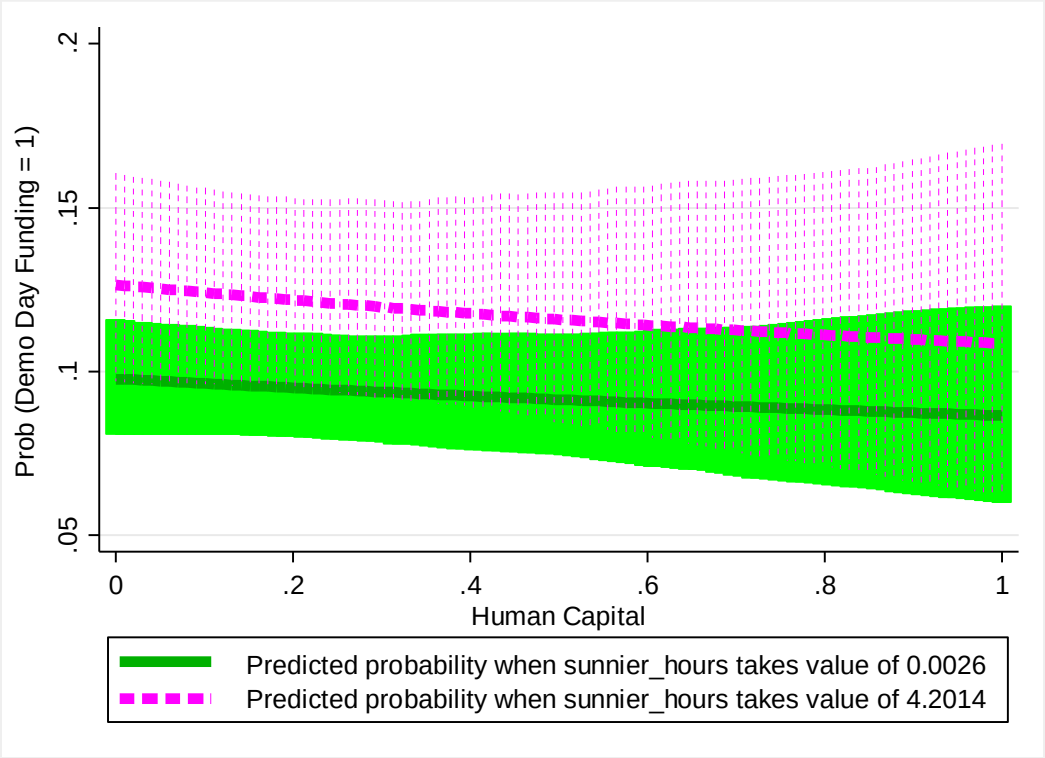


Figure 4: Test of Hypothesis 4: The Interaction Between *Sunnier* and *Human Capital*

Panel A – Funding Likelihood for 'Sunnier' and 'Non-Sunnier' Demo Days



Panel B – Funding Likelihood: The net effect ('Sunnier' minus 'Non-Sunnier' Demo Days)

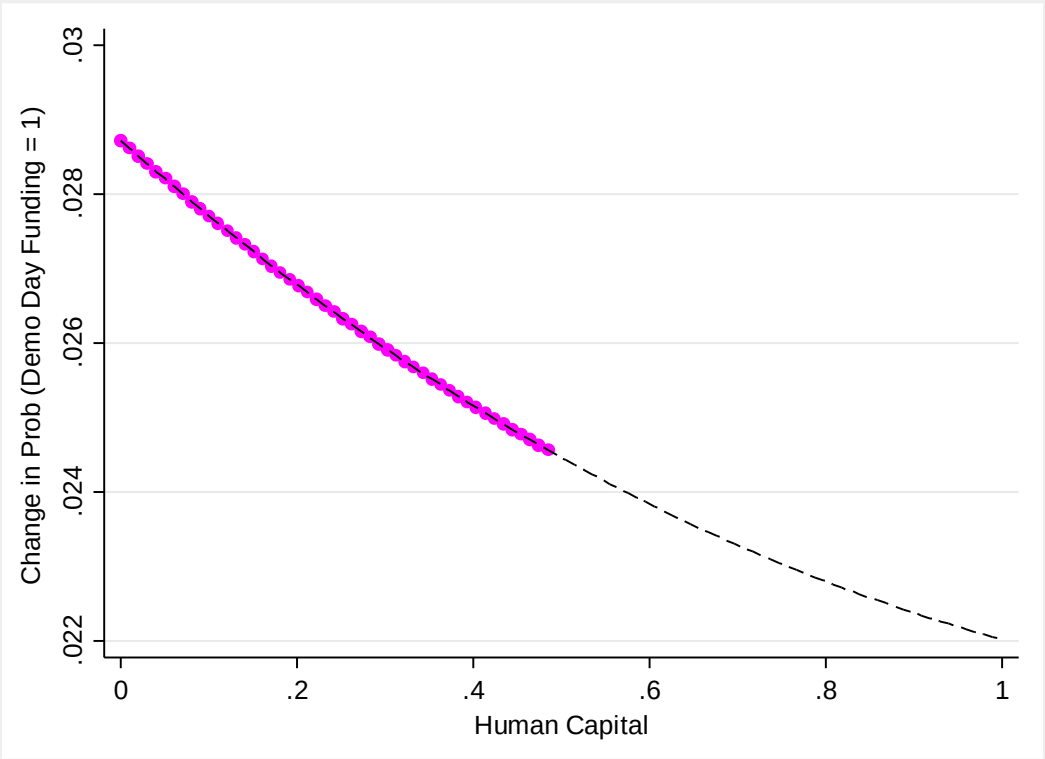


Figure 5: Screenshot of the Experimental Instrument

Imagine today is a sunny day. Yesterday's clouds are nowhere to be seen.

We would like to ask you a few simple questions. Would you like to proceed?

- Yes
- No

Imagine today is a cloudy day. Yesterday's sun is nowhere to be seen.

We would like to ask you a few, simple questions. Would you like to proceed?

- Yes
- No