A Contingent Approach to Entrepreneurial Decision-Making:

The Role of Novelty and Uncertainty

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Abstract: The entrepreneurship and strategy literatures have generated many related theoretical and empirical insights regarding decision-making and the relationship between individual personality characteristics and entrepreneurial behavior. Yet, several of these insights appear to be mutually inconsistent. This paper develops a parsimonious theoretical framework to reconcile these apparent inconsistencies by contextualizing entrepreneurial decision-making in terms of two foundational concepts: (a) the novelty associated with the decision-making context and (b) the extent to which the outcomes of the decision may be quantified (uncertainty). We apply our framework to develop testable (circumstance-contingent) propositions that propose boundary conditions for several well-known but disputed claims in the entrepreneurship and strategy literatures and identify when different decision-making tools are likely to be most effective.

1. INTRODUCTION

Research in the fields of entrepreneurship and strategy have extensively examined decision-making processes associated with entrepreneurial or strategic actions, as documented by several review articles over the years (Eisenhardt & Zbaracki, 1992; Leiblein, Reuer, & Zenger, 2018; Schwenk, 1995; Shepherd, Williams, & Patzelt, 2015). Representative actions include market entries by new or established companies, introductions of new products, and significant capital investments. Although we have learned much from this work, it has also produced competing theoretical claims and empirical findings that are at times inconsistent and contradictory. Additionally, there are instances where scholars seem to employ similar concepts in disparate contexts without recognizing the parallels in their applications.

Consider the choice to apply a particular decision-making tool. The concept of "simple rules" is a heuristic born from managerial decision-making research and widely employed in established firms (Hodgkinson *et al.*, 2023). Yet, it has become an indispensable tool for navigating decision-making in new ventures (Eisenhardt & Bingham, 2017). Conversely, the notion of entrepreneurial heuristics, such as "pick two, choose one," design thinking, and design for experimentation (Gans, Stern, & Wu, 2019), initially created for entrepreneurial contexts, have found utility in larger, more bureaucratic settings (Kolko, 2015). Likewise, the notion that seasoned entrepreneurs navigating high uncertainty base their decisions on the "affordable loss principle" as proposed by Sarasvathy (2001) aligns with the concept of downside risk management. However, this latter concept is acknowledged in traditional financial (e.g., Roy, 1952) and managerial (e.g., Cyert & March, 1963; Kahneman & Tversky, 1979) theories, which are frequently applied within established corporations.

The existence of similar approaches across these two literature streams leads us to question whether distinctive assumptions associated with the individual fields underpin the research in each area. In particular, are these approaches universal, or are some tools better suited to entrepreneurial rather than traditional decision-making contexts? More pointedly, how should managers decide which decision-making tool to use? For instance, past decades have witnessed many high-profile entries into low-cost air service by both new airlines (e.g., Southwest, Ryanair, JetBlue) and legacy airlines (e.g., British Airways' Go, Delta's Song). Should the managers of the new airlines have used different decision-making tools than the managers of the legacy airlines because the former are more "entrepreneurial" than the latter?

Similarly, academic research examining associations between individual attributes and entrepreneurial or managerial judgment outcomes has yielded conflicting findings across many dimensions (Georgalos, 2018; Kerr, Kerr, & Xu, 2018), despite the longstanding focus in the entrepreneurship literature on how "entrepreneurs" differ in their cognitions from "managers" (Shepherd *et al.*, 2015). For example, several studies suggest that entrepreneurs display greater risk-taking propensity than managers (Chanda & Unel, 2021; Stewart & Roth, 2001). Yet, others argue that the role of risk propensity in entrepreneurship remains unresolved (Miner & Raju, 2004). Indeed, whereas entrepreneurs are often lionized as intrepid risk-takers capable of disrupting entire industries, the vast majority of new businesses formed in the United States remain small and never hire a single employee (SBA, 2023). So, should we expect the managers of new low-cost airlines to be more risk-seeking than the managers of legacy airlines who launched low-cost subsidiaries, or not?

The overlapping and contradictory claims and findings in current research highlight a significant lacuna of both scholarly and practical significance. This paper aims to bridge this

void by introducing a framework that formulates a decision-making theory in relation to the quintessential actions of an entrepreneur-manager, such as market entry. Our approach is intentionally parsimonious. We do not claim that our framework incorporates every relevant aspect of entrepreneurial or managerial decision-making. Rather, in the spirit of addressing "some salient aspects of [the] phenomenon…while still being parsimonious" (Makadok, Burton, & Barney, 2018), our theory focuses on two contingencies of the decision-making context, each of which has been the subject of significant scholarly attention. First, a considerable body of work has underscored the significance of *uncertainty*, that is, the degree to which the possible outcomes of a potential action cannot be quantified and probabilities ascribed to them (Arend, 2024; Knight, 1921; Park & Shapira, 2017).[1] Second, many scholars regard *novelty*, that is, the creation of something new, such as new means-ends relationships (Shane & Venkataraman, 2000), new combinations (Schumpeter, 1934), or new organizations (Gartner, 1988), as essential to entrepreneurship. While uncertainty and novelty are intertwined (Dosi & Egidi, 1991; Kapoor & Klueter, 2021), this link has not always been clearly presented. Moreover, the literature has not clarified whether or how variation in these two decision parameters determines which decision-making tool should be used or the desired attributes of the focal entrepreneur-manager.

This paper provides a way to connect the decision-making context and the use of desired decision-making tools or entrepreneur-manager attributes. For example, we argue that, based on both the attributes of a decision-making context and the knowledge of the decision maker, decision-support tools based on exploration and heuristics (e.g., test two, choose one) become more effective than data-driven, mathematical tools (e.g., discounted cash flow analysis) as the

[1] Some work uses the term *ambiguity* for this concept (e.g., Koh, 1996; Koudstaal, van Praag, & Sloof, 2016).

uncertainty associated with a decision increases. Moreover, we argue that an entrepreneur-manager's attitude toward risk and uncertainty and other salient personality characteristics will vary systematically with the novelty and uncertainty of their decision-making environment. For instance, openness to experience will tend to be associated with novelty since it implies that the entrepreneur-manager will be experiencing something new—indeed, they may be literally creating the new experience through their entrepreneurial endeavors. By contrast, entrepreneurs who operate in less novel contexts (e.g., taking over the family business) will not tend to be especially open to experience.

Our paper thus contributes by proposing a new, parsimonious framework for organizing related theoretical and empirical claims in the entrepreneurship and strategy literature, identifying their boundary conditions associated with prominent claims in these literatures, and reconciling conflicts among them. Our paper also contributes by developing several testable propositions related to the choice of decision tool and personality characteristics of entrepreneur-managers in different decision-making contexts; all of these propositions propose a reconciliation of conflicting and overlapping claims in the literature. Finally, we offer guidance for future theoretical and empirical work in entrepreneurship and strategy, as well as practical guidance to managers engaged in entrepreneurial and strategic decision-making, recruitment, investment, and the management of their own careers.

2. NOVELTY, UNCERTAINTY, AND ENTREPRENEURIAL DECISION MAKING

Table 1 summarizes several of the most influential theories in the field of entrepreneurship and related areas of strategy. A key takeaway from the table is that every theory is concerned with novelty, uncertainty, or the decision-making environment, including the decision-maker; in fact, most theories incorporate all three elements, implying there is something fundamental about

them to entrepreneurship. However, the literature has not elucidated how changes in novelty and uncertainty across the decision-making environment influence the choice of a particular decision-making approach or the desired attributes of a decision-maker. We address this issue by first discussing the type of action (and thus the type of decision) on which we are focusing and then each of novelty and uncertainty in turn, as well as the relationship between them.

Insert Table 1 about here

2.1 Actions with Entrepreneurial or Strategic Content

Research in entrepreneurship and strategy highlights that every entrepreneurial or strategic action (e.g., founding a new venture, entering a market, introducing a new product) has at least one associated decision and at least one decision-maker (Douglas & Shepherd, 2002; Hambrick & Mason, 1984; Zhao, Seibert, & Lumpkin, 2010). Entrepreneurship is a process or journey that is initiated with the decision to take action (Hambrick & Mason, 1984; McMullen & Dimov, 2013) or, as Wood, Bakker, and Fisher (2021: 148) put it, even entrepreneurial action theory itself "is broadly concerned with the *decision* to take action toward entrepreneurial endeavors under conditions of uncertainty" [our emphasis]. If there is heterogeneity in decision-maker experience and experience affects perceptions and judgments regarding the environment, then differences in experience are likely to affect the chosen tool and one's facility with that tool.

Accordingly, our unit of analysis is a decision. Specifically, we define our unit of analysis to include both the decision-maker and decision-making environment associated with an entrepreneurial or strategic action. We are particularly interested in decision-making with respect to actions that have been the focus of prior scholarly attention. For example, in describing what

she called *entrepreneurial services*, Penrose (1959) in *The Theory of the Growth of the Firm* spoke of introducing new ideas, innovation (whether developed internally or via external proposals), expansion, and significant changes to the firm's organizational structure (Kor, Mahoney, Siemsen, & Tan, 2016; Ross, 2014a). More recent work echoes this focus, speaking of the creation of organizations (Gartner, 1988), the assemblage of factors of production (Lazear, 2005), the discovery and exploitation of new means-ends relationships (Shane & Venkataraman, 2000), and structural transformation (McMullen, Ingram, & Adams, 2020). In strategy, for its part, entire subfields study topics such as acquisition and divestiture, market-entry, and the acquisition of strategic factors (Barney, 1986; Makadok & Barney, 2001; Ross, 2014a).

We recognize that each of these canonical actions could be decomposed virtually without limit; for example, entering a foreign market requires choosing the product or service, entry mode (joint venture, acquisition, or greenfield operation), the location of the new operation in the target country, etc. In principle, these subordinate actions come to resemble what Penrose (1959) called *managerial services*, especially when they are low impact and require little cognitive effort (e.g., where to buy office supplies). While managerial services could also be treated by the theory we develop herein, we focus on the decision-making associated with the more impactful canonical actions, because entrepreneur-managers must ultimately resolve the question of whether and how to proceed with a canonical strategic action and decision-making tools are usually intended for such important actions (i.e., whether to build a new plant but not where to buy office supplies). Thus, similar to the manner in which classical transaction cost economic reasoning focuses on discrete choices such as whether or not to build a dedicated plant (Williamson, 1985, 1991) rather than decomposing this choice into contractual details or whether to lay the next brick in building the plant, we focus on canonical entrepreneurial actions.

2.2 Novelty

The *entrepreneurial function* described by Schumpeter (1934) in *The Theory of Economic Development* and the *entrepreneurial services* described by Penrose (1959) both emphasize newness or the "novelty" of new products, business models, and markets. If creativity is the generation of new and useful ideas, then common sense and casual empiricism suggest that inventing a new product, service, or means-ends relationship and establishing a new organization, whether formal or informal, are often inherently creative and entrepreneurial activities (Gruber & MacMillan, 2017). Indeed, Amabile (1997) describes entrepreneurial creativity as the development of novel and useful products, services, or business models.

The development of novel and useful ideas, in turn, involves cognitive effort and flexibility (Seligman & Csikszentmihalyi, 2000). Cognitive effort is devoted to defining (and re-defining) problems, applying theory to generate plausible alternative solutions, and prioritizing and/or testing these solutions. Defining the problem involves domain-relevant skills and expertise that allow individuals and groups to formulate problems in a way that increases the chances of generating a good solution. Generating plausible solutions involves the ability to think broadly, to abandon inappropriate assumptions or routines, and to tolerate ambiguity. Prioritizing and testing potential solutions involves designing experiments or generating feedback on the likelihood of creating and capturing value through the solution (Martin, 2009; Simon, 2019).

Consistent with the above discussion, the entrepreneurship literature proposes several processes that may facilitate the novel framing and alternative solution generation for business problems. For example, novelty in decision making may involve either the search for and discovery of new opportunities (Shane & Venkataraman, 2000) or the effectuation and creation

of new possibilities (Sarasvathy, 2001). Thus, the novelty may be associated with the originality of the effort to formulate a problem (Nickerson and Zenger, 2004), to search and select among a set of alternatives in a complex space (Gans *et al.*, 2019), or the originality of the design and construction of a new product or service (e.g., effectuation that elicits "surprise," as in the development of the original iPhone). These cognitive endeavors may be—and are—undertaken by both owners and employees of organizations, large and small. Any individual may have a creative insight, regardless of their status within a company or organization. Novelty is simply an individual or collective cognitive attribute of a solution to a decision-making need that distinguishes it from other, more ordinary, economic behaviors such as day-to-day management or what Penrose called *managerial services*.

While prior work has often associated novelty with the attributes of the entrepreneurial action—for example, new, statistically atypical, or unique outcomes—our emphasis on decision-making foregrounds differences in the cognitive effort, flexibility, and creativity at the individual or collective level (Baron, 2004; Baron & Ward, 2004; Ward, 2004). On one end of the creativity spectrum, consider the cognitive load associated with replicating an existing organizational form (e.g., Army unit or chain store). Presumably, this would require little creativity if the decision-makers are sufficiently experienced to understand the process. Some "new" products are also derivative, such as changing superficial characteristics of a product to produce a new stock-keeping unit (e.g., a new size or color), and would accordingly represent an incremental market or technical change (Ansoff, 1957). The antipode to this extreme would be efforts to devise an entirely new technical component (e.g., using advanced materials), a new system (e.g., innovative cellular therapeutics in biotechnology), or a new business model (e.g., the first discount airline, Southwest, or the first targeted-frills airline, JetBlue).

Thus, as these examples illustrate, decision-making with regard to actions commonly considered to fall under the "entrepreneurial" umbrella are likely to vary in both the level of cognitive effort and flexibility that they require. These examples also demonstrate the importance of the decision-maker. A great deal of creative thinking and effort may be required of a new franchisee launching a new franchise in an unfamiliar location (especially on matters for which the franchisee does not receive training). The same task may be routine for the franchisor or an experienced franchisee. Thus, when David G. Neeleman founded JetBlue, he had already founded two other airlines, MorrisAir and WestJet; so, starting JetBlue, though still representing a novel and creative act, did not require as much creative cognition as it would have of a founder less experienced with passenger air travel. For the same reason, imitating a first-mover's action is not novel by definition and requires less creativity than deciding to be that first-mover. Thus, the decision-making context varies along the dimension of "novelty," with problems and solutions sometimes being highly novel, other times less so, and still other times not novel at all. Moreover, as we discuss more below, variation in novelty affects the challenges faced by the decision-maker and, thus, the relevance of the specific attributes, experience, training, and tools that are likely to be most valuable for a given situation.

2.3 Uncertainty

Actions with significant entrepreneurial or strategic content often yield a range of possible outcomes, reflecting different levels of success or failure, among other relevant aspects. Some new product launches *succeed* spectacularly, such as the classic example of Coca-Cola's introductions of Diet Coke in 1982 and Coke Zero in 2005, whereas other product launches *fail* spectacularly, such as Coca-Cola's reformulation of its flagship cola in 1985, which ultimately had to be withdrawn. Sometimes, even similar choices yield vastly different outcomes, as when

Honda's introduction of a motorcycle for the average American in the 1950s was a fabulous success even though Indian Motorcycle had failed with the same idea a decade earlier (Makadok & Ross, 2018).

Variation in possible outcomes is known to influence decision-making in general (Rabin & Thaler, 2001). In classical economics and theories predicated on economics-based reasoning, this variation in outcomes has often been labeled *risk*, and it is assumed that different outcomes can be quantified and their probabilities assessed by the decision-maker, *a priori*, thereby allowing for probabilistic (or expected utility) reasoning (e.g., Ching, Gans, & Stern, 2019; Kihlstrom & Laffont, 1979; Ross, 2014a, 2014b).

However, a long tradition of scholarship in both entrepreneurship and strategy has recognized that, in the real world, entrepreneur-managers face significant frictions in applying expected utility reasoning (Cantillon, 1755; Kirzner, 1997; Knight, 1921; Koudstaal *et al.*, 2016). As Knight observes, assigning probabilities to outcomes is not always possible if the situation "…is in a high degree unique" (Knight, 1921). The decision-maker might not have a well-founded idea of what outcomes are possible or how to classify them (Langlois & Cosgel, 1993), or know how their future self will feel about these possible outcomes (i.e., future preferences might be unknown) (Rogotti & Shannon, 2005). Moreover, even if it is possible to describe alternative potential outcomes, their probability of occurrence may be hard to assess. For example, "the market" may not (yet) exist, or it may exist, but other market participants may also have trouble assessing probabilities and thus imputing a value to specific outcomes (Demsetz, 1988; LeRoy & Singell, 1987; Townsend *et al.*, 2023). In these situations, it may not be possible to optimize a decision (Mousavi & Gigerenzer, 2017: 3). On still other occasions, even if it were possible to develop categories of observations and estimate probabilities for them, decision-

makers may, due to cognitive limitations, tend not to do so. For example, when playing blackjack in a casino, most players do not have the ability or the inclination to memorize all the cards as they are played from a shoe and then mathematically optimize their gameplay. Likewise, entrepreneurs and CEOs often rely on hunches or simple calculations in deciding on important actions, as when the management team at Walt Disney allegedly decided to acquire the ABC television network after some simple calculations on the back of a napkin. These frictions to applying expected utility reasoning have historically been called *uncertainty* in the literature (Knight, 1921; Park & Shapira, 2017) and create significant obstacles that limit entrepreneur-managers' reasoning.[2]

Another tendency in the historical literature, perhaps arising from the goal of theoretical parsimony, was to regard uncertainty as a binary: expected utility reasoning is either possible or it is not. In recent years, however, scholars have begun to recognize that, in entrepreneurial settings, "*partial* knowledge restricts entrepreneurs' ability to identify the entire set of choices and probability of each outcome" (Knight, 1921; Moeen, Agarwal, & Shah, 2020: 221) [our emphasis]. Where a team of decision-makers is involved, moreover, parties may *partly* disagree about important aspects, such as the future value of their idea (Kaul, Ganco, & Raffiee, 2020), perhaps because they have different subjective probability assessments of future outcomes (Savage, 1954). Partial knowledge and partial disagreement, by definition, can range from low to high. The implication is that the more complete the knowledge of decision-makers, because, say, they have relevant experience or outcomes are a function of well-known variables, the more that

[2] Uncertainty is used in other ways in the literature, as well. Examples include the colloquial usage of simply not being certain about future outcomes and many other possibilities (e.g., Dequech, 2011; Packard, Clark, & Klein, 2017). To avoid confusion, we use uncertainty to denote the degree to which the decision-making context, including the nature of the decision maker, are an obstacle to quantifying outcomes and imputing a probability to their occurrences. Some scholars use the term *ambiguity* to connote uncertainty, as we define it herein.

they will be able to quantify outcomes, impute a probability to their occurrence, and, in a group decision-making context, come to a mutual understanding (Foss, Klein, & Murtinu, 2022).

That uncertainty should be a continuous measure also makes sense from first principles. We note the well-known analogy that human decision-making resembles a "scissors" of which one blade is the task environment and the other is the cognitive capability of the decision-maker (Simon *et al.*, 1987). Accordingly, whether contemplating an action with important entrepreneurial or strategic content (e.g., whether to acquire the ABC network) or playing a card game like blackjack, the decision maker may (a) be able to rely on little more than a hunch or "gut feel" (high uncertainty) (Huang & Pearce, 2015), (b) have the information and ability to perform detailed data-driven calculations (low uncertainty), or (c) have limited information and knowledge, allowing for back-of-the-envelope assessments, as in the story of Walt Disney's acquisition of ABC or in the blackjack heuristic of adding 1 for every face card played and subtracting 1 for every other card played, with a view to getting a handle on whether the deck favors the house or the players. Thus, uncertainty, like novelty, may be low, allowing for expected utility reasoning, or it may be high, foregrounding guesses, vision, and judgment, or it may be somewhere in between.

2.4 The Space defined by Novelty and Uncertainty

Novelty and uncertainty are analytically separable but correlated. They are correlated because novel decision-making contexts will also tend to be those where the decision maker lacks experience and data on similar situations. At one extreme, the emergence of a novel decision implies that the decision-maker has no experience from which to identify potential outcomes associated with this decision, to estimate the probabilities associated with these potential outcomes, or to influence these potential outcomes. This lack of foundational knowledge

complexifies the decision-making space, perhaps even to the point where outcomes cannot be envisaged at all, much less probabilities be imputed to their occurrence. Likewise, if there is great uncertainty associated with a potential action, it is likely because the situation is unique (Knight, 1921)—that is, novel—for the entrepreneur-managers contemplating the action.

It is possible to illustrate the relationship between novelty and uncertainty through a series of examples. For instance, the launch of a new venture using a new technology is likely to be associated with high novelty and high uncertainty. Conversely, opening a new branch of a retail chain in a location similar to those where the chain already operates is not very novel and the likely outcome from opening the new store can be predicted with reasonable accuracy and the risks quantified. Thus, novelty and uncertainty are both low. Likewise, the range of outcomes associated with decisions taken in day-to-day management—Penrose's managerial services—can usually be bounded, even if not precisely quantified. For example, the stakes associated with where to get office supplies, which office cleaning service to retain, or which rental car agency to use for corporate business purposes are low; thus, even if the outcomes associated with these actions cannot be precisely quantified, the low stakes limit the range of the outcomes, reducing uncertainty. Clearly, these situations are not usually very novel for the decision maker, either.

Even so, novelty and uncertainty are analytically separable. The literature on the "Bowman paradox" suggests that better performance is more predictable (Bowman, 1980), and thus less uncertain. Hence, a novel innovation to a firm's production or process that improves performance may be associated with lower outcome uncertainty. Similarly, the Black-Scholes-Merton option pricing formula was highly novel and its creation undoubtedly required a great deal of creative cognition, yet this formula actually turned the valuation of options from a highly uncertain endeavor that relied on hunches and gut feeling to a rigorous, quantifiable, and thus

low-uncertainty process. Conversely, some decisions can be highly impactful to the point of generating a wide range of unpredictable outcomes, even if the procedures and processes for making the decision are established to the point of being routine. An example could be hiring a new CEO. In these situations, uncertainty is high, but novelty is low.

We accordingly use novelty and uncertainty to define a two-dimensional space representing the universe of decision-making of entrepreneur-managers. See Figure 1, in which the dots represent decisions. The variation in their density across the figure is meant to convey that decisions tend to cluster around the 45-degree line, and that more decisions (such as in day-to-day management) occur near the origin. In particular, at the origin, where novelty and uncertainty are low, decision-making is relatively simple. These routine decisions are typically mechanistic and may be usefully guided by standard decision-making processes or personal experience. By contrast, classic entrepreneurship, like launching a high technology venture in a new market, involves decision-making far from the origin, requiring high levels of novelty in the face of high uncertainty. We claim that different decision processes and attributes are required in these settings.

Our framework thus categorizes different classes of decision-making contexts and allows us to systematically develop and test predictions suggesting whether particular decision-making attributes, experiences, training, or tools will be selected and effective in each region defined by this space. Moreover, to the extent that it is difficult to publish a "negative" finding without the support of a clear theoretical prior, by proposing a testable framework with clear propositions, we ease the burden on future empirical research. We now turn to applying our framework to reconcile well-known conflicting claims in the literature and develop testable propositions.

Insert Figure 1 here

3. APPLYING THE FRAMEWORK

Stating clear assumptions and unambiguous propositions that draw connections among phenomena and expose the underlying processes embedded in causal relationships has long been regarded as a hallmark of good theory building (Bettis, Gambardella, Helfat, & Mitchell, 2014; Sutton & Staw, 1995). As the argument runs, scholars must carefully distinguish between neighboring concepts to develop a theory strong enough to tell an accurate story about why certain behaviors, processes, and events occur. In doing so, they will improve their readers' understanding of the systematic reasons for certain relationships and better answer the prevailing "queries of why." Moreover, for any set of theoretical statements to communicate stated relationships clearly and parsimoniously, they must operate within a set of agreed-upon constraints and boundary conditions (Bacharach, 1989).

With that in mind, our theory builds on existing research to suggest a way to clarify and reconcile disputed claims within the study of managerial actions with significant entrepreneurial or strategic content. In particular, we posit that different entrepreneur-managers and decision-making approaches will be more commonly observed and more efficacious in different regions of the space defined by novelty and uncertainty. In line with a long tradition of management theory, our theory holds that the best approaches for making certain decisions are contingent on decision-making conditions and the decision maker (Porter, 1962). We now apply our theory to some of the most well-known and disputed claims in entrepreneurial research. This application both harmonizes different perspectives in the field and generates testable implications.

3.1 Decision Tools

It has long been proposed that there is something different about how entrepreneurs approach decision-making, with some even proposing that the resources available to an entrepreneur, not a specific business goal, should drive entrepreneurial decision-making and often do, an approach called *effectuation* (Sarasvathy, 2001). Conversely, the classic decision-making tool for evaluating a "project" available to a firm is discounted cash flow analysis (DCF). So, does this mean that entrepreneurs should not use DCF and corporate managers should not use effectuation? What about other decision tools, such as comparing a project to "comps," i.e., similar public firms or firms recently acquired in the M&A market? What about "simple rules" that have been suggested for "high velocity" environments (Eisenhardt & Bingham, 2017)? We argue that uncertainty as defined herein, i.e., non-quantifiability of outcomes, is a pivotal determinant of which type of decision tool will be most effective and, thus, which tools we will observe most often used in practice. We make our argument using a thought experiment in which we start with a low level of uncertainty and work our way higher.

To start, consider an entrepreneur-manager contemplating whether to proceed with a new project, for example, a new branch of a retail chain, new factory, or an entirely new firm. The entrepreneur-manager decides to apply DCF: if the project has a positive net present value and no other use of the capital for the project would yield a higher value, then the entrepreneur-manager would proceed with the project. Now, DCF may be easiest to apply for an investment such as a bond, which has regularly scheduled principal and interest payments and, almost always, a set maximum maturity. To value a bond, an investor would calculate the present value of each future principal and interest payment by discounting it using a compound interest rate set to compensate for the riskiness of the payment. For the entrepreneur-manager's project, DCF

would instead be applied to expected future cash flows, that is, the mathematical mean of future cash flows from the project, where the discount rate is typically set to match the firm's weighted average cost of capital. If the entrepreneur-manager has good data available from similar projects and the possible outcomes can be reasonably predicted well into the future, at least to the level of base, upside, and downside cases, the required inputs for DCF are available and the method is convenient.

Yet, even in reasonably well-established industries, DCF may be hard to apply because some of the required inputs are subject to significant guess work (Heaton, 2022). An example would be ventures that rely on predicting market conditions well into the future (e.g., a new mine). Although it is possible to value the later years of a project by assuming an average growth rate in perpetuity, this growth rate, which is precisely what is hard to predict, often has an outsized influence on the valuation returned by DCF. In consequence, even if, at an abstract level, one could still apply DCF in these cases, many real human beings find it unworkable because they are simply guessing at the required inputs for the DCF calculation. Put differently, there is more uncertainty, so DCF is no longer the best decision tool.

In such cases, recourse will often be had to "comps," that is, similar projects or firms and their valuations in relation to various *current* financial metrics (e.g., earnings before interest and tax or revenue per customer), as derived from examining the market capitalization of public firms or the prices paid in the market for corporate control.[3] Notably, these methods are partly quantitative and but also partly based on judgment, because the entrepreneur-manager has to decide which comps are most relevant and how the proposed project compares to them. Put

[3] See, for example, https://corporatefinanceinstitute.com/resources/valuation/comparable-company-analysis/, visited June 4, 2024.

differently, because uncertainty is now a bit higher, the most useful decision tool should rely less on quantitative analysis and a bit more on judgment.

Now, suppose the entrepreneur-manager does not have appropriate comps, and useful financial data exist but are significantly incomplete. An example would be international expansion by an established brand. A fast food or fashion retail concept entering a new foreign market would have data on other, similar markets to inform their decisions but also expect to undertake substantial adaptation after testing the local market, much as fashion retailer Zara does by starting with a flagship store in a prominent location in a new country before expanding. Decision tools with an options lens have been designed for this somewhat higher level of uncertainty. Examples include real options decision-making (Bowman & Hurry, 1993; McGrath, 1999; O'Brien & Folta, 2009), option games (Smit & Trigerogis, 2004), option tools with ambiguity (Cartea & Jaimungal, 2017), options tools with noise (Leiblein, Chen, & Posen, 2017; Posen, Leiblein, & Chen, 2018), and scenario planning exercises (Schoemaker, 1995). A notable feature of these decision tools is that they combine some elements of trial and error while not neglecting the financial data at hand. Thus, like using comps, they have a quantitative aspect, but unlike comps, they are partially experimental, reflecting their usefulness when uncertainty becomes significant.

Many entrepreneur-managers face even greater uncertainty than contemplated by real options reasoning. They have a hunch that a new technology might serve as the basis for a new business model—as when Marc Randolph and Reed Hastings envisioned a mail-order movie business based on the then new DVD technology—or, to provide a more modest example, the entrepreneur-manager might be someone with very little business experience who tries a new cuisine (say, Korean or Egyptian food) in a big city and imagines that they might find a market

for this cuisine back home in their small town. In these examples, due to the newness of the idea or the lack of experience of the decision-maker, the entrepreneur-manager has little more than intelligent speculation to go on.

For these situations, scholars have developed decision-making frameworks such as "simple rules," local search, and trial-and-error learning. Although such decision-making tools require some formalistic cognition, they generally have a stronger bias for action. These are pragmatic approaches that portray the entrepreneurial process[4] as one of forming beliefs, testing these beliefs, and then using available feedback to update these beliefs (Zellweger & Zenger, 2021). These approaches reduce highly complex decision-making contexts to simpler choice sets (e.g., test two, choose one) and thus can be thought of as a structured heuristic, rather than a mathematical formula for which the required inputs are missing (Felin, Gambardella, & Zenger, 2021; Gans, Scott, & Stern, 2018; Zellweger & Zenger, 2021). What is more, the trial-and-error nature of these frameworks reduces the uncertainty in potential outcomes facing decision-makers by giving them feedback from the environment. Thus, perhaps paradoxically to some, a feature of these tools is that they make decision-making less "entrepreneurial" by reducing uncertainty through experimentation (Agrawal, Gans, & Stern, 2020; Gans *et al.*, 2019) and thereby potentially allowing for the successful subsequent use of more quantitative decision tools. For instance, to test the feasibility of their idea, Marc Randoph and Reed Hastings tried mailing DVDs to see how quickly they arrived at their destinations and whether they arrived in satisfactory condition. The result of such experiments provided data that could have allowed the Netflix founders to use more formalistic decision tools.

[4] Ries (2011) helped these ideas enter the public lexicon with the release of *The Lean Startup* in 2011, which introduced entrepreneurs to the concept of releasing low-cost minimum viable prototypes to reduce uncertainty.

As this discussion illustrates, the most convenient and effective decision tool varies systematically with uncertainty; specifically, the lower the uncertainty, the more quantitative the most effective decision tool. Moreover, given a general tendency by entrepreneur-managers to choose the most appropriate tool, we expect that, in practice, more quantitative decision tools will be more frequently used, the lower the uncertainty faced by the entrepreneur-manager, due both to circumstance and their own experience, knowledge, and cognitive ability. Thus, as the entrepreneur-manager becomes more experienced with a particular type of action, they will rely more and more on decision tools with quantitative inputs.

> *Proposition 1. The lower the uncertainty associated with the outcomes of an action (both due to circumstance and the experience, knowledge, and cognitive ability of the entrepreneur-manager), the more than that the most effective decision tool will make use of quantitative inputs and the more that the entrepreneur-manager will rely on tools that rely on quantitative inputs.*

3.2 Attitudes toward Risk and Uncertainty

Scholars have long associated tolerance for risk and uncertainty with entrepreneurship. As noted previously, the entrepreneurship literature has often characterized the entrepreneur as operating in highly uncertain environments, i.e., those where possible outcomes from entrepreneurial actions cannot be precisely known or probabilities attributed to them because the situation is unique (Knight, 1921). Risk, for its part, measures dispersion in outcomes where these quantities can be computed (e.g., variance about the mean). In the standard expected utility framework of risk preferences, risk is a "bad" in the sense that the value of a "lottery" is declining in the associated variance of its payouts, holding the expected payout fixed. Many scholars regard entrepreneurs as constituting a small subset of the population that is attracted to the possibility of large gains from high-risk ventures, whereas most people are more averse to risk and so take wage employment with less variable compensation (Kihlstrom & Laffont, 1979).

The empirical literature on whether entrepreneurs differ from managers or the general population in terms of their tolerance of uncertainty (sometimes, called *ambiguity*) is not extensive and exhibits conflicting findings (Georgalos, 2018). Some work has found that entrepreneurs have high tolerance for uncertainty (Koh, 1996). Other work finds no differences between entrepreneurs and others (Holm, Opper, & Nee, 2013; Koudstaal *et al.*, 2016).

The literature on differences in risk preferences is far larger. On the one hand, when factors such as entrepreneurial ability and financing constraints are held constant, preferences over risk play a critical role in determining entry into entrepreneurship (Astebro, Herz, Nanda, & Weber, 2014). In line with this, the meta-analysis of Stewart and Roth (2001) found that entrepreneurs have a significantly greater propensity for risk than managers. On the other hand, much empirical work finds that entrepreneurs are not necessarily more risk-seeking than non-entrepreneurs but simply perceive risky situations more favorably or may have dynamic risk tolerance levels (Brockhaus, 1980; Palich & Bagby, 1995; Sexton & Bowman, 1983; Smith & Miner, 1983; Vereshchagina & Hopenhayn, 2009). Xu and Ruef (2004), for their part, demonstrate that most nascent entrepreneurs do not fit the popular image of the risk-seeking founder. They show in a large representative sample that nascent entrepreneurs are more risk-averse, having founded their venture in pursuit of autonomy and identity fulfillment.

In general, the evidence that entrepreneurs differ from corporate managers in terms of attitudes toward risk and uncertainty is "inconclusive if not contradictory" (Kerr *et al.*, 2018: 313). Faced with this conflicting evidence, Miner and Raju (2004) and Stewart and Roth (2001) make evident that risk attitudes can vary between populations of entrepreneurs based on their primary goals upon entry (e.g., high-growth vs. family income). Similarly, Block, Sandner, and Spiegel (2015) demonstrate how the different motivations for entering self-employment

(opportunity vs. necessity entrepreneurship) impact observed differences in risk attitudes. Despite these efforts, however, there is still no consensus regarding why or whether the risk attitudes of entrepreneurs differ from those of other populations (e.g., employees and business managers). Additionally, it remains unclear why there is so much observed heterogeneity in risk attitudes among populations of entrepreneurs. Issues related to the measurement of risk attitudes (risk perceptions vs. risks taken) further muddle the research landscape.

Our framework provides a useful lens to reconcile these mixed findings by suggesting conditions where decision-makers are more or less likely to exhibit certain preferences vis-à-vis risk and uncertainty. Consider opening a new franchise (e.g., a McDonald's restaurant). The franchisee, can, with the guidance and training of the franchisor, plan and execute a new franchise location with accurate financial forecasts based on the results of many previously opened franchise locations. Thus, uncertainty is low and tolerance of uncertainty would not be required of the franchisee. Indeed, one benefit of the franchise system is to enable business owners to insulate themselves from uncertainty, increasing the pool of potential franchisees. By contrast, in the high novelty, high uncertainty region into which classic, high-tech ventures fall, many famous entrepreneur-founders have exhibited behaviors suggestive of high tolerance for uncertainty. For example, it is often noted that Microsoft's Bill Gates and Paul Allen dropped out of college to pursue their venture or that Elon Musk invested his last $35 million into his electric vehicle startup Tesla Motors at the height of the financial crisis, in each instance in pursuit of highly-speculative visions of new technologies whose payoffs were hard to quantify precisely. Thus, we would expect entrepreneur-managers who operate in the low-uncertainty region of Figure 1 not to exhibit high tolerance for uncertainty, whereas those who operate in the high-uncertainty region would exhibit high tolerance for uncertainty.

With regard to risk, we note that if risk is low, uncertainty cannot be more than moderate. The reason is that low risk implies that the decision maker knows at least that the range of possible outcomes is fairly narrow and thus has at least some ability to place bounds on them and quantify them. If risk is high, uncertainty could still be low. An example would be placing one's entire life savings on the color red of a roulette wheel. With just under a 50% chance, one would double one's life savings, and with just over a 50% chance, one would lose everything. This wager is clearly risky, but it is also entirely quantifiable and, hence, not uncertain at all. However, we submit that in business practice, situations like the foregoing are not that common. Rather, when the range of possible outcomes from a new venture, market entry, or product launch, say, is large, the same lack of good data that makes it hard to precisely predict the outcome will also make it hard to quantify the outcomes and attribute probabilities to them. Hence, although *some* entrepreneur-managers may have a high tolerance for risk but not for uncertainty, more commonly, the same underlying personality disposition that makes an entrepreneur-manager tolerant of a wide range of possible outcomes from a risky action will also make that decision maker tolerant of the wide (but hard to quantify) outcomes from a highly uncertain action.

If we combine this reasoning with our foregoing discussion of uncertainty, then, entrepreneur-managers who operate in the low uncertainty region of Figure 1 will not tend to have higher risk tolerance than other populations, because that region is also low risk. Entrepreneur-managers who tend to operate in the high uncertainty region of Figure 1 will tend to have higher risk tolerance than other populations, because high uncertainty implies wide dispersion in outcomes—albeit they are hard to quantify—just as high risk does. Meanwhile,

although decision makers who exhibit high risk tolerance but low uncertainty tolerance may exist, they are not that common. We thus have the following proposition:

> *Proposition 2. The more that an entrepreneur-manager tends to take actions associated with high uncertainty, the greater that entrepreneur-manager's predicted tolerance for uncertainty and risk.*

3.3 Overconfidence

In a similar but different vein, it has long been argued that entrepreneurs are more confident than other businesspeople in their assessment of business prospects (Camerer & Lovallo, 1999; Chen, Croson, Elfenbein, & Posen, 2018; Cooper, Woo, & Dunkelberg, 1988). In support of this, Åstebro and Chen (2014) review several studies that indicate entrepreneurs both overestimate their abilities relative to others and are overly optimistic and certain in their estimates of future performance. On the other hand, others have argued that rather than being "optimistic martyrs" (Dosi & Lovallo, 1997), entrepreneurs rely more heavily on heuristics (Busenitz & Barney, 1997), which leads to over-optimistic situational assessments. Indeed, some scholars have reported no significant difference between the confidence of entrepreneurs and managers in established firms (Koudstaal *et al.*, 2016). As with our discussion of risk and uncertainty above, these contrasting claims raise the question of whether or when each perspective is more correct.

Our framework offers a plausible explanation for these mixed findings. Consider an owner or senior executive of a retail chain who is evaluating opening another branch, or an owner or manager of a factory who is evaluating a capital expenditure to increase production of an existing product line. The low uncertainty associated with these decision-making contexts should prompt the use of data-driven decision tools, such as discounted cash flow analysis (as we argued above). The formulaic nature of such tools will reduce the possibility that the decision

maker's biases will contaminate the decision to proceed or not and also facilitate intervention by others should the decision-maker appear to be making an obvious blunder.

Conversely, when entrepreneur-managers operate in what are, from their perspective, unpredictable and thus uncertain environments, they will lack the data for highly quantitative, data-driven decision tools. Hence, such entrepreneur-managers will rely on heuristics, hunches, and qualitative assessments. These approaches to decision making leave far more to the decision-maker's discretion and are thus vulnerable to biased interpretation.

Now, in principle, an entrepreneur-manager could be either under or overconfident. However, underconfident entrepreneur-managers will, in uncertain decision-making contexts, tend to arrive at negative assessments about actions such as market entry, new product launches, or new strategic orientations. Where these actions relate to starting new firms—as they often do in the entrepreneurship literature—the natural tendency of such underconfident entrepreneurs will be not to enter at all or to exit early due to the effect of under-confidence on their learning (Chen *et al.*, 2018). Hence, such entrepreneurs will not form a large part of the pool of entrepreneurs in a typical empirical study. In contrast, overconfident entrepreneurs will, due to their excessive optimism about their idea and ability, over-enter and persist too long in the market. Thus, unlike decision-making contexts with low uncertainty, contexts with high uncertainty enable a selection mechanism whereby the pool of entrepreneurs (as they are typically defined in empirical work) will be disproportionately overconfident vis-à-vis corporate managers and the general public.

> *Proposition 3. The more that an entrepreneur-manager tends to operate in decision making contexts associated with high uncertainty, the greater that entrepreneur-manager's predicted confidence.*

3.4 Personality Traits

The Big-5 model of personality measures five traits that contain a unique set of distinguishing features (McCrae, 1987): openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism; each of these has been linked to heterogeneity in career selection and performance (John, Naumann, & Soto, 2008). Over the past several decades, researchers have used these dimensions to claim that entrepreneurs differ from managers, in particular, that entrepreneurs are more open to experience and extraverted. Yet, the findings from the empirical literature on these points are fragile.

To start, consider openness to experience, which measures receptivity to new ideas and experience. On the one hand, a meta-analysis has confirmed that, on average, entrepreneurs are more open to experience than are managers (Zhao & Seibert, 2006). However, that result was associated with an 80% credibility interval that crossed zero, suggesting that the overall mean difference obscured much variation (Zhao & Seibert, 2006). In line with this, more recent research has found that entrepreneurs do *not* exhibit more openness to experience (López-Núñez, Rubio-Valdehita, Aparicio-García, & Díaz-Ramiro, 2020).

As noted previously, the cognitive processes underlying novel decisions have been identified as one of the defining attributes of entrepreneurship. Creativity and novelty have in turn been linked with divergent thinking and openness to (new) experiences (Dyer, Gregersen, & Christensen, 2019). Some even assert that the desire to create is a major motivation for entrepreneurship (Engle, Mah, & Sadri, 1997; Shah, Agarwal, & Echambadi, 2019). Thus, those who flourish in challenging environments by conceiving, developing, and testing novel solutions, businesses, and products are likely to be aided by increases in openness to experience. Indeed, entrepreneur-managers who operate in highly novel regions of the space, producing truly

innovative products such as new forms of internet commerce, novel technologies, and new social media, are almost of necessity open to new experience since they are enacting the new experience of which they are a part.

Conversely, managers, at least in many large firms, have chosen to operate in rigid, bureaucratic settings that stifle creativity and entrepreneurialism (Sørensen, 2007; Weber, 1947), suggesting an aversion to new experiences. In fact, it is arguably an aversion to new experience that could keep many such managers in their corporate jobs and prevent them from trying something new by, for example, starting their own firm on their own or with others. Likewise, many small businesses are opened by people with a family background in the same industry—for example, a jewelry store owner whose parents owned a jewelry store in a different city. Such entrepreneur-managers are operating in what are, from their perspective, highly familiar (not novel) environments and accordingly would tend to score low on openness to experience. We thus have the following proposition:

> *Proposition 4. The more that an entrepreneur-manager tends to operate in decision making contexts associated with high novelty, the greater that entrepreneur-manager's predicted openness to experience.*

Extraversion, for its part, measures how enthusiastic, energetic, dominant, active, and talkative an individual is (McCrae, 1987). As with openness to experience, there are mixed findings regarding whether entrepreneurs are more extroverted than business managers are, as well as whether any differences in extraversion affect performance outcomes. It might seem as though the need to persuade stakeholders regarding the value of innovations and other novel business practices would imply that extraverted individuals would be more successful entrepreneurs than less extraverted individuals, but no consistent difference in extraversion between entrepreneurs and non-entrepreneurs has emerged in the literature (Zhao & Seibert,

2006). Indeed, some research on small business owners has shown that entrepreneurs are *less* extroverted (more introverted) than the typical business manager. As an example, Envick and Langford (2000) provide evidence that individuals who enter self-employment from home do so to escape coworker interactions.

Personality differences across entrepreneurial populations is a topic where the chosen milieux of the entrepreneur is particularly consequential. Silicon Valley entrepreneurs are engaged in ventures pushing highly novel products and services and, thus, will benefit from the ability to enthusiastically communicate their ideas with thousands of individuals to attract the human, social, and financial capital required for growth and a successful exit. Therefore, they are likely to be highly extroverted, at least in professional settings.

By contrast, as with our example of the jewelry store owner above, many entrepreneurs do not operate in highly novel regions of the decision-making landscape. Rather, some families, extended families, and communities strongly establish themselves in certain industries in particular regions (e.g., US motels, ethnic beauty products). Someone from such a family background who takes a job in the relevant industry is not engaged in the process of creating novel solutions. If said person ultimately goes on to open their own business in the relevant industry, they would not necessarily benefit from extraversion because attracting significant and numerous stakeholders to novel ideas would not be a necessity for survival; their community is already there to serve as a source of needed resources.

> *Proposition 5. The more that an entrepreneur-manager tends to operate in decision making contexts associated with high novelty, the greater that entrepreneur-manager's predicted extraversion.*

4. DISCUSSION

This paper provides a theoretical framework that uses novelty and uncertainty to organize the decision-making associated with the actions at the center of much research in entrepreneurship and strategy. We propose that the novelty and uncertainty faced by a decision maker are important dimensions that determine how the decision maker *should* choose an action, how the decision maker is likely to choose an action, and the personal attributes of the decision maker. We then used our theoretical framework to establish boundary conditions among well-known claims in the literature and reconcile conflicts among them.

Implications for Research

A key implication of our analysis is that theories about entrepreneurial decision-making and actions are circumstance-contingent. In highlighting this possibility, our essay brings attention to a common recommendation for most new theories—to provide well-defined boundary conditions beyond which the theory would not apply. Likewise, our essay implies that empirical researchers who document "stylized facts" about entrepreneurs in isolation or vis-à-vis other populations should anticipate and confirm boundary conditions beyond which the empirical regularity will no longer hold.

Our overarching claim is that the unique theoretical mechanisms and empirical findings of various strands of entrepreneurial scholarship are likely to vary across the space defined by the degree of novelty and uncertainty surrounding decision outcomes. Thus, for example, an ethnographic study of a new venture in a creative industry would need to incorporate the tendency for the decision-maker to face highly uncertain outcomes, as well as the tendency of entrepreneurs in such industries to apply decision-making heuristics. Conversely, a study of new business formation or closure would be best informed by a theory that does not rely on certain

stereotypical traits of entrepreneurs, such as extraversion, because most entrepreneurial market entry and exit decisions are for "main street" businesses, in which context entrepreneurs would not necessarily benefit from an extroverted personality.

This simple statement suggests several implications. One, we contend that acknowledging the underlying purpose and assumptions of these research questions upfront will make it easier to postulate boundary conditions on theoretical and empirical claims at the outset, rather than claiming, implicitly or explicitly, to make a statement about entrepreneurial decisions writ large. Similarly, although, in recent years, more researchers are recognizing the importance of heterogeneity among entrepreneurs, our framework provides a systematic way of organizing that heterogeneity. In particular, we suggest that scholars should be precise about the levels of novelty and uncertainty in the decision-making environment when discussing the external validity of their studies. Moreover, acknowledging these assumptions implies an opportunity to develop new contributions by seeking out and testing anomalies and contingencies implied by existing theory and evidence.

Testable Empirical Implications

As we illustrated with our propositions, our theory leads directly to several testable empirical questions. For example, our claim that entrepreneurs who operate in high novelty contexts will tend to be more open to experience than those who operate in other contexts is clearly testable. Several additional claims that could be the subject of empirical inquiry are already laid out in the manuscript in the form of propositions. In addition, explicating the dimensions underlying the decision-making space raises a question regarding whether entrepreneurial decision-making contexts are evenly distributed across all the combinations of the two dimensions in our framework. We argued herein that because novelty and uncertainty are correlated, there will be

more activity along the 45-degree axis of Figure 1, but the distribution of decision-making in Figure 1 may vary in other ways, as well.

All research methods involve tradeoffs among desiderata such as generalizability, measurement precision, and realism (McGrath, 1981). The distinctions between novelty and uncertainty highlighted in our manuscript suggest that judgment tasks and experiments may be particularly useful when testing our propositions. For example, future work might test the associations proposed by our theory by examining whether individual traits or the use of particular decision tools aids in the completion of paper and pencil judgment tasks or competitive games that vary across the dimensions highlighted in our framework. It might also be informative to study decision-makers "in the wild" to examine whether and how the approaches and tools they utilize differ across the types of decisions highlighted by our framework.

Managerial Implications

Our theory has important implications for practitioners. To would-be and actual entrepreneurs, we say, "Know where you and your venture are in the space defined by novelty and uncertainty!" The tools you learned in your entrepreneurship courses or the advice you just read in your favorite business publication may or may not have you or your venture in mind. Undoubtedly, it may be affirming to the soul to liken oneself to famous entrepreneurs like Elon Musk and Steve Jobs, but practitioners need to be honest with themselves about whether they even aspire to enter the high novelty, high uncertainty region that these individuals inhabit. There is a big difference between opening your own accounting boutique and an Internet enterprise. Ventures in regions of the space closer to the origin will, in general, be better served by the application of more traditional decision-making frameworks and financial planning tools. If the management challenge is to choose the appropriate decision-making tools for the problem at

hand, our framework provides a guide to identify when particular tools or approaches are most likely to be useful. Our framework also provides guidance on which type of venture is most likely to suit an entrepreneur's personality by foregrounding questions such as, "How comfortable am I making decisions without good data?" Or, "How creative am I?" In general, would-be entrepreneurs whose inclinations are toward lower-uncertainty, lower-novelty environments should arguably focus more on "main street" entrepreneurship than high-tech entrepreneurship.

These managerial implications have corresponding lessons for investors deciding whether to back a founding team, entrepreneurial firms deciding whom to hire, and the composition of entrepreneurial teams themselves. Based on our framework, we argue that the level of uncertainty and novelty in the decision-making environment are important factors for determining the ideal attributes of the decision-maker in terms of decision-making style, attitudes toward risk and uncertainty, and personality characteristics. A good match between entrepreneur and environment is conducive to success, and a bad match to failure.

Limitations and Extensions

We believe that our theory has the potential to shed light on significant debates within the literature on entrepreneurship. However, as we said at the outset, we do not in any way wish to suggest that novelty and uncertainty are the only dimensions of decision-making that could affect entrepreneurship or that our theory resolves every debate. Other decision-making dimensions such as complexity, interdependence, and group dynamics may well have significant explanatory power for establishing boundary conditions among some conflicting claims in the literature and selection of decision tool or process. For example, in a recent laboratory experiment comparing the behavioral attributes of entrepreneurs, managers, and employees, Koudstaal *et al.* (2016:

2897) provide evidence indicating that "entrepreneurs perceive themselves as less risk averse than managers and employees," but using experimental measures are "only found to be unique in their lower degree of loss aversion, and not in their risk or ambiguity [uncertainty] aversion." Thus, future research might productively explore associations between not just different aspects of the decision-making space but the implications of different types of problems for additional behavioral attributes, as well as various popular management tools (e.g., Rigby & Bilodeau, 2018). We hope that our work can serve as a template for scholars who study how these other important aspects of decision making may inform our understanding of entrepreneurship.

Following a long tradition, novelty and uncertainty are the core dimensions of our framework. Some scholars may prefer to subdivide novelty or uncertainty into more precise attributes (Arend, 2024; Rindova & Courtney, 2020). We acknowledge that there are different sources and types of novelty as well as differences between sources and types of "uncertainty" (e.g., ambiguity, risk, volatility, and Knightian uncertainty). Our theory is robust to these refinements. It would only be necessary to map the utility of entrepreneurial decision-making tools and personality attributes to different types of novelty and uncertainty. We believe that digging more deeply into these sub-dimensions of entrepreneurial decision-making is a fruitful area for future research.

We also acknowledge additional limitations. Whereas we focused on entrepreneurship from the perspective of decision-making, scholars from other fields may find different dimensions of entrepreneurship more useful for conceptualizing the field. We also did not focus herein on the boundaries of managerial decision-making itself. Consider someone who closely follows fashion trends and has a following on social media. Would it be entrepreneurial if this person devises a bold new look (novelty) and wears it at an important social event in the face of

potentially divergent reactions from peers (uncertainty)? In the spirit of this paper, we would answer Yes, but as a practical matter, the decision of this hypothetical fashion "influencer" is unlikely to garner much scholarly or pedagogical attention in modern business schools. This issue merits further theoretical attention.

Conclusion

The field of entrepreneurship writ large can only reach its potential until each of its empirical and theoretical claims is understood by its originators and audience as fitting into a larger whole. We believe that leveraging the concepts of novelty and uncertainty advances the field by suggesting a parsimonious way in which scholars with different theoretical lenses, empirical contexts, and disciplinary orientations can harmonize their theoretical and empirical claims. More research is needed on how entrepreneurship's constituent bodies of knowledge cohere into the greater field. In this paper, we have offered a starting point for those efforts.

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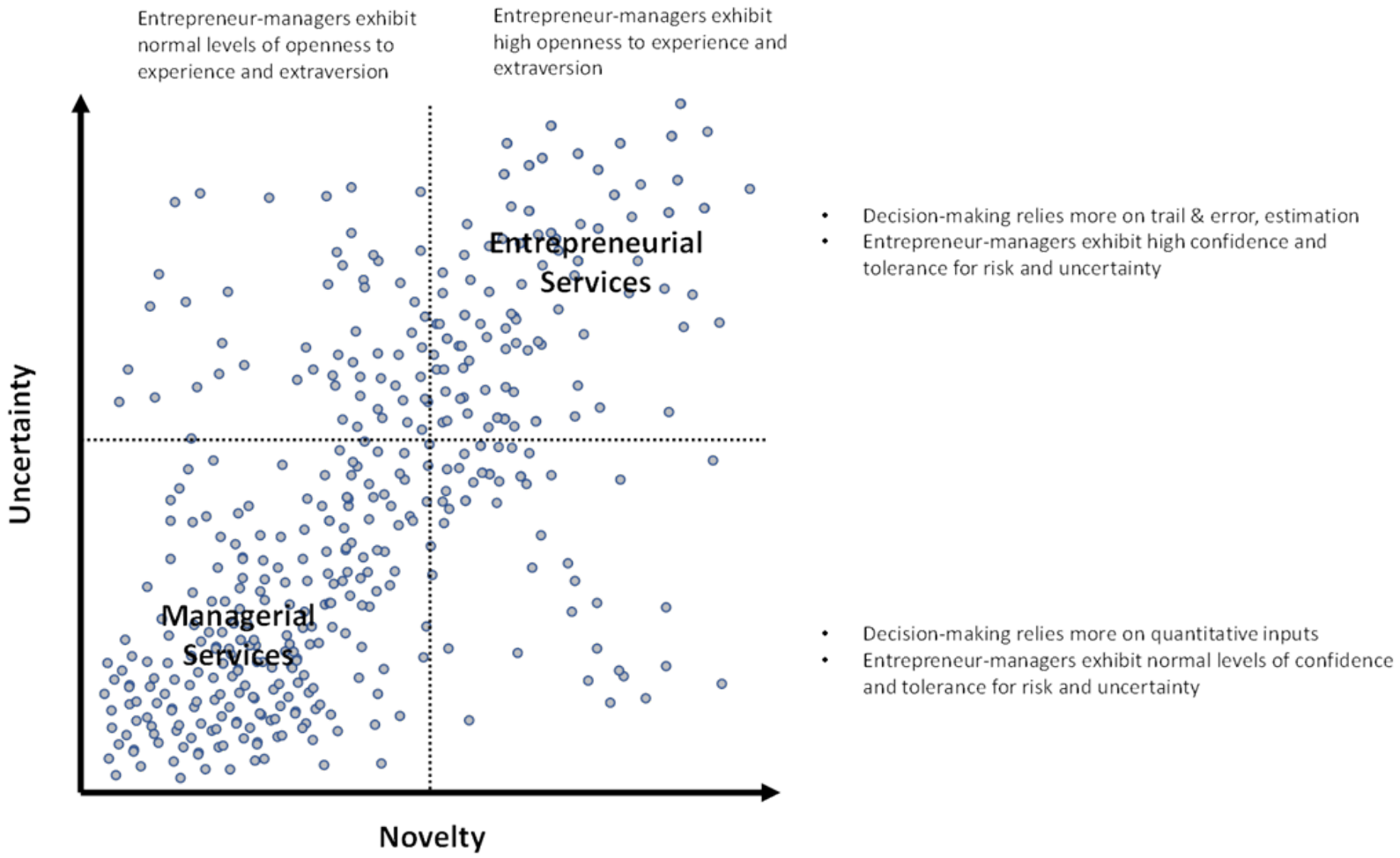
Table 1: Foundational Papers on Entrepreneurship

Theory	Citation(s)	Google Scholar Citations	Unit of Analysis	Description	Treatment of Novelty	Treatment of Risk/Uncertainty	Treatment of Decisions/ Decision Maker
Schumpeterian Entrepreneurship	Schumpeter (1934); Schumpeter (1943)	70,190; 52,522	The entrepreneur	The entrepreneur is a catalyst for economic growth via innovative activity that leads to cycles of "creative destruction."	Creativity is key; entrepreneurs introduce new products, processes, and organizational structures to replace old ones.	While acknowledging market uncertainties, Schumpeter suggested that the entrepreneur isn't the risk bearer; financial risk falls on the capitalist, not the entrepreneur.	Schumpeter posited that creative combinations of resources are always preceded by a decision, assuming that everything unfolds according to that decision.
Penrosian Growth	Penrose (1959)	45,614	Firms	It emphasizes that firms grow and expand by maximizing the productive use of their internally developed resources and capabilities, particularly in an environment of uncertainty and change.	Novelty emerges from the firm's internal growth and development. As firms learn and develop internal resources, new growth opportunities are identified.	Uncertainty is inherent in the firm's growth process.	Decision-making is tied to the firm's strategic direction and how resources are deployed for growth. Managers utilize firm-specific knowledge and resources to decide the firm's growth strategy.
Behavioral Theory of Entrepreneurship	Gartner (1988)	7,983	New Venture Creation	The focus shifts from entrepreneurs' traits to their behaviors, highlighting that entrepreneurs' actions are key to explaining entrepreneurship.	Novelty is implicitly treated, derived from the behaviors and actions that lead to new venture creation.	Risk and uncertainty are embedded within the entrepreneurial behaviors and the actions taken during new venture creation.	The decisions made by entrepreneurs are shaped by their behaviors and actions throughout the process of new venture creation.
Judgement facing Uncertainty	Knight (1921); Foss, Foss, Klein, and Klein (2007); Foss and Klein (2012)	32,600; 349; 930	Assembly of Resources (Investment)	Entrepreneurship is judgment-based decision-making under uncertain conditions, even when no clear model or decision rule is available due to incomplete or unreliable data.	Judgment is not limited to daring, boldness, or innovation but is exercised in mundane scenarios for ongoing operations as well as new ventures, creating new opportunities.	Risk is distinguished as measurable uncertainty, whereas uncertainty is unmeasurable. In practice, risk involves known outcome distributions, while uncertainty stems from unique situations with no known outcome distributions.	Decision-making under uncertainty is entrepreneurial, and it doesn't necessarily require traits like imagination, creativity, or leadership.
Discovery Theory	Shane and Venkataraman (2000); Shane (2000)	23,024; 7,383	Opportunity	Entrepreneurial opportunities arise because different people have different information, allowing them to discover and sell new goods, services, raw materials, and organizing methods at a profit.	Novelty is created by introducing and selling new goods, services, raw materials, and organizing methods at greater than their cost of production.	Risk is not an explicit feature of discovery theory. However, tolerance of investment risk in the decision-making environment is discussed as a key trait of entrepreneurs.	Exploiting discovered entrepreneurial opportunities depends on the joint characteristics of the opportunity and the nature of the individual; not all discovered opportunities are brought to fruition.
Creation Theory	Alvarez and Barney (2007)	3,550	Opportunity	Entrepreneurial opportunities do not exist but are created by the actions, reactions, and enactment of entrepreneurs exploring new ways to produce goods and services.	Novelty is fundamental to creation theory, as entrepreneurs actively create new opportunities rather than passively discover existing ones.	Uncertainty is fundamental because opportunities are created, not found, leading to a lack of information about possible outcomes at the decision point.	Decision-makers navigate uncertainty through iterative, inductive, and incremental decision-making, relying on biases and heuristics while prioritizing affordable losses to learn and adapt.
Effectuation	Sarasvathy (2001)	8,374	Entrepreneurs, Firms, Stakeholders	A model of entrepreneurial reasoning that describes how, under conditions of uncertainty, entrepreneurs make decisions based on their available resources, personal abilities, and existing networks.	Novelty is embraced as entrepreneurs start with their available means and co-create opportunities with stakeholders, leading to unexpected outcomes.	Uncertainty is seen as a positive aspect; entrepreneurs interact with it instead of trying to reduce it. They focus on the potential losses they can afford, which are within their control, rather than maximizing returns.	Decisions are made iteratively, adapting as new information becomes available and new stakeholder interactions occur.

Figure 1. The Space Defined by Novelty and Uncertainty



Note: Each dot represents a decision taken by an entrepreneur-manager, as defined in the text (over some particular period of time, in a particular economy). The relative density of the dots is meant to convey the idea that such decisions arise more frequently along the 45-degree diagonal and that managerial decisions are more common than entrepreneurial decisions (in the Penrosian sense).