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Effectuation under risk and uncertainty: A simulation model

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ABSTRACT

Effectuation was first proposed as an expert entrepreneur's decision-making framework under uncertainty, but the applications of effectuation beyond the condition of uncertainty have seen less attention. Using an agent-based simulation model, this paper investigates the effectiveness of effectuation relative to causation in uncertain and risky contexts. The simulation overcomes the shortcomings of think aloud protocols typically used in effectuation research. The results suggest that effectuation outperforms causation in both risky and uncertain contexts until the entrepreneur can predict the future correctly > 75% of the time. This suggests expanding the boundary of effectuation from uncertainty to whenever predicting the future is challenging.

Executive summary

As a field, entrepreneurship has primarily borrowed theories from other disciplines to help explain the phenomenon of entrepreneurship. These theories come from a variety of disciplines from psychology and economics to strategic management and organizational behavior. In attempts to delineate the field as an academic discipline some theories have been proposed and perhaps the most prominent of those uniquely entrepreneurially theories is effectuation.

Effectuation is often described as a combination of decision-making heuristics. Entrepreneurs effectuate by focusing on their means, short-term experimentation, affordable loss, pre-commitments, and flexibility. Despite a growing body of research examining a variety of applications of effectuation, there have been several critiques of effectuation as a theory. One common critique has been the lack of clarity regarding effectuation's boundary conditions relative to causation; particularly the role of risk and uncertainty.

To that end, this paper develops a simulation model to test the effectiveness of effectuation and causation in both risk and uncertainty. Much of the research on effectuation has relied on case studies and think-aloud protocols due to the difficulty in collecting data more broadly. The simulation model overcomes this issue by abstracting the firm to a series of decisions and creates a risky or uncertain context within which the firm attempts to improve its performance. We manipulate the decision-making process of the firm as causation or effectuation; the environment as risky or uncertain; and the predictive ability of the entrepreneur.

Our results suggest that effectuation is the dominant decision-making strategy in both uncertain and risky environments until the entrepreneur can predict the future with a very high degree of accuracy. Firm performance using causation improves dramatically once an entrepreneur in our model can predict the future with > 75% accuracy. Our findings are robust to multiple varied manipulations of the inputs. The performance of effectuation strategies show limited variance with regard to the predictive ability of the entrepreneur. As opposed to the performance of causation strategies which very much depend on the predictive ability of the entrepreneur.

The implications for these findings suggest that uncertainty is not a proper boundary condition for effectuation as it proves to be

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an effective strategy in risky environments as well. Thus, bounded rationality is a more appropriate frame for where effectuation is applicable. These results help clarify part of the theoretical issues surrounding effectuation and enable better empirical testing to further the application of effectuation.

From a practical perspective, the implications of this model suggest that effectuation offers a more consistent path to higher performance regardless of the entrepreneur's ability to predict the future. The maximum returns, however, are reserved for entrepreneurs who can very accurately predict future outcomes and act accordingly. This aligns with high failure rates and large returns that accrue to high-growth startups.

1. Introduction

Effectuation research has become a central theoretical concept in entrepreneurship (Sarasvathy, 2001; Arend et al., 2015). This stream of research offers a model for decision-making that differs from traditional methods put forth in strategy and management research (Brinckmann et al., 2010). Research on effectuation has impacted marketing (Read et al., 2009a; Whalen and Holloway, 2012), R&D projects (Brettel et al., 2012), and financing (Wiltbank et al., 2009; Dew et al., 2009). While its application has been broad, some central tenets of effectuation remain imprecise.

As Arend and colleagues (Arend et al., 2015) point out effectuation falls short in several categories as a full-fledged theory. This does not negate the contributions of the research on this concept; it only serves to draw attention to the areas where additional work must be done to clarify important areas of the concept (Read et al., 2016). Some empirical testing may improve our understanding (Perry et al., 2012), but some areas must be clarified at the theoretical level (Welter et al., 2016). That is to say, specific areas of effectuation require additional theoretical development prior to large-scale empirical tests.

One of the areas that requires further investigation is the context in which effectuation is both applicable and effective (Welter et al., 2016). Effectuation was first explicated as a decision-making paradigm under the condition of Knightian uncertainty (Knight, 1921; Sarasvathy, 2001). This was in contrast to causation, which was considered the dominant decision paradigm, particularly under the condition of risk. However, much of the research has failed to represent uncertain contexts as meaningfully different from risky contexts (e.g., Dew et al., 2009). As such, we cannot be sure if effectuation is an appropriate and effective decision-making paradigm in all contexts or strictly under uncertainty (Perry et al., 2012; Welter et al., 2016). Therefore, this paper addresses the following question: How effective is effectuation, as opposed to causation, in the context of risk versus uncertainty?

To address this question, we develop a simulated fitness landscape wherein entrepreneurs attempt to reach higher levels of performance. Throughout this agent-based simulation, we create uncertainty by changing the landscape or remaking it anew. This method enables us to overcome the difficulty of creating uncertain environments in experimental or natural settings. We manipulate the decision-making context (uncertainty-risk), and the skill of the entrepreneur in predicting the future. Our findings suggest a more nuanced understanding of the tradeoffs between effectuation and causation. In general, only when an entrepreneur can accurately predict the future > 75% of the time does causation clearly outperform effectuation. This suggests expanding the theoretical domains to which effectuation is applied. In other words, effectuation's boundary condition of uncertainty appears to be overly restrictive. This research suggests that effectuation as a theory is applicable in any situation involving boundedly rationale decision makers.

2. Theoretical development

2.1. Risk in entrepreneurship

The concept of risk has been central to entrepreneurship since Knight (1921). Initially, Knight described three probability situations: statistical probability, empirical probability, and estimates. Risk, in the entrepreneurship literature, has been aligned with empirical probability (see Miller, 2007) as Knight claimed that statistical probability was akin to games of chance where probabilities were manipulated based on mathematics.

Studies on risk developed Knight's work into expected utility maximization (Arrow, 1951; Savage, 1972; Miller, 2007). From here, research examined whether or not entrepreneurs differed in risk propensity than non-entrepreneurs (see Miner and Raju, 2004 for a meta-analysis). While there are recent efforts to further this stream (Hvide and Panos, 2014), the majority of research has turned to understanding how entrepreneurs may vary in risk perception (Palich and Bagby, 1995) or other cognitive differences (Baron, 1999).

Outside the mind of the entrepreneur, risk research in entrepreneurship has followed the Knightian tradition in prescribing that uncertain situations be reduced to risk or avoided (Knight, 1921; Miller, 2007). For the most part, this was the dominant framing, or underlying assumption, in much of the entrepreneurship literature until recently (Alvarez and Barney, 2007). This has, in part, led to the conflation of risk and uncertainty (Alvarez and Barney, 2010; Welter et al., 2016). Alternatively, risk and uncertainty could be considered opposite ends of a continuum (Edelman and Yli-Renko, 2010), and, thus, some research simply refers to degrees of risk or uncertainty (Brinckmann et al., 2010).

In practice, it is very difficult to understand whether individual decisions were made in conditions of risk or uncertainty. Ignorance of probabilities does not equate to their lack of existence (Knight, 1921). Moreover, understanding risk raises the issue of level of analysis. An entrepreneur could address risk at an individual decision level or at the firm level as an agglomeration of each of these individual decisions (McMullen and Shepherd, 2006). Both problems raise complicated empirical challenges which have led to the reliance on case studies and think-aloud protocols in effectuation research (Perry et al., 2012). However, a simulation approach can both specify the level of analysis and overcome perceptual issues on the part of the entrepreneur.

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