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**GET IT TOGETHER! SYNERGISTIC EFFECTS OF CAUSAL AND EFFECTUAL  
DECISION-MAKING LOGICS ON VENTURE PERFORMANCE**

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## ABSTRACT

Entrepreneurs rely on different decision-making logics when starting new ventures, including causal and effectual reasoning. Extant research suggests that venture performance is positively associated with both causal business planning and effectual action-orientation, but studies have not yet tested the synergistic potential of these two logics. We contribute to the debate on entrepreneurial decision-making by exploring the interrelationship between causation and effectuation, detailing their main and interactive effects on venture performance. Using survey data collected on 1,453 entrepreneurs residing in 25 countries, we find that ventures benefit from using these two entrepreneurial logics in tandem.

## INTRODUCTION

To cope with the uncertainties associated with new venture creation, entrepreneurs can opt for different strategies. Planning and action have long been considered two fundamental, yet often contradictory, approaches in managing organizations. Mintzberg and Westley (2001), for example, distinguished between a rational (“think first”) and an action-oriented (“act first”) approach to decision making<sup>1</sup>. Nevertheless, there has been quite some debate about the relative value of planning and action for successful entrepreneurship. In their recent meta-analysis, Brinckmann, Grichnik, and Kapsa (2010) summarize the vivid debate about the importance of business planning for entrepreneurial performance. Alternatively, emphasizing the action element in entrepreneurship, different scholars have explored the importance of improvisation strategies for venture performance (Baker, Miner, & Eesley, 2003; Hmieleski & Corbett, 2008). In a similar vein, Sarasvathy (2001) proposes that the future cannot be predicted by writing plans, and that experienced entrepreneurs therefore adopt an effectual (rather than a causal) approach, attempting to control the future by taking action. Finally, new pedagogical models emphasizing experiential learning are steadily replacing conventional planning-oriented methods of teaching entrepreneurship (Honig, 2004; Neck & Greene, 2011), and the question arises whether the combined pursuit of planning and action-oriented approaches may help aspiring entrepreneurs establish long-living ventures in the market.

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<sup>1</sup> In addition to a third intuitive (“seeing first”) approach.

Empirically, research linking planning and action to venture performance has yielded inconsistent results. First, meta-analytic evidence suggests that the frequently tested relationship between planning and performance is in fact highly contingent upon endogenous and exogenous factors (see Brinckmann et al., 2010). Second, while several scholars have linked the action-oriented effectuation approach to increased venture performance (see Perry, Chandler, & Markova, 2012), this finding deserves further empirical scrutiny. Building on the foundational work of Sarasvathy (2001, 2008), entrepreneurship scholars have studied the role of effectuation in a variety of contexts, including the Swedish mobile internet industry (Berglund, 2007), Norwegian tourism firms (Alsos & Clausen, 2014), Twitter users (Fischer & Reuber, 2011), and UK home-based online businesses (Daniel, Di Domenico, & Sharma, 2014). Although the number of quantitative studies exploring the nature, antecedents, and consequences of employing an effectual strategy has grown in recent years (e.g., Appelhoff, Mauer, Collewaert, & Brettel, 2016; Dew, Read, Sarasvathy, & Wiltbank, 2015; Werhahn, Mauer, Flatten, & Brettel, 2015), much of the extant empirical literature still relies on qualitative research methods (e.g., Akemu, Whiteman, & Kennedy, 2016; Watson, 2013). As the state of effectuation research can no longer be classified as nascent (Perry et al., 2012), more deductive theory-testing studies are needed to explore the web of nomological relationships between effectuation and its antecedents and consequences, and to shed light on its relationship with alternative entrepreneurial approaches.

In the present study, we distinguish between two alternative decision-making logics for explaining venture performance: that is, predictive (causal) and controlling (effectual) logics. Whereas in practice entrepreneurs frequently use effectuation and causation in tandem (Sarasvathy, 2001, 2003), theory development and empirical evidence concerning potentially synergistic effects between these two approaches is currently still at an early stage. In addition to discussing the conceptual interrelations between effectual and causal decision making, and

their linkages with performance, we therefore empirically examine their main and interactive effects on venture performance. Assuming that the interplay between the two logics is synergistic, we propose that entrepreneurs' combined use of effectuation and causation will have a greater impact on venture performance than the sum of their two main (i.e., independent) effects. To test whether the adoption of effectuation and causation is conducive to venture performance (Berends, Jelinek, Reymen, & Stultiëns, 2014; Chandler, DeTienne, McKelvie, & Mumford, 2011; Perry et al., 2012), we use an international dataset comprising 1,453 student entrepreneurs residing in 25 different countries.

We aspire to make three contributions with this paper. First, following the call by Perry et al. (2012) to clarify the relationship between effectuation and alternative entrepreneurial approaches, we aim to assess the relationship between effectuation and causation (generally regarded as the dominant alternative logic) both conceptually and empirically. Effectuation scholars have been criticized for incomplete theory building (Arend, Sarooghi, & Burkemper, 2015, 2016), and there is a vivid, continued debate concerning the future development of the effectuation literature (Garud & Gehman, 2016; Gupta, Chiles, & McMullen, 2016; Read, Sarasvathy, Dew, & Wiltbank, 2016; Reuber, Fischer, & Coviello, 2016). Further research contributing to the advancement of effectuation as a theory of entrepreneurship is therefore warranted.

Second, by measuring causation and effectuation independently (Wiltbank, Dew, Read, & Sarasvathy, 2006), and testing for their main and interactive effects on venture performance, we are able to determine how the two logics contribute to explaining entrepreneurial outcomes. Several researchers have started to investigate the interplay between the two logics (e.g., Alsos & Clausen, 2014; Evald & Senderovitz, 2013; Maine, Soh, & Dos Santos, 2015; Nummela, Saarenketo, Jokela, & Loane, 2014; Reymen et al., 2015; Sitoh, Pan, & Yu, 2014), but empirical evidence of their interactive effects on venture performance is still lacking. As Read et al. (2016,

p. 531) highlight: “[e]ffectuation research needs to spell out in more detail [...] useful ways to mix and match predictive and non-predictive strategies [...].” We thus provide new insights into how causal and effectual logics interact and supply “evidence of relationships between effectuation and [...] business planning” (Perry et al., 2012, p. 855). Our findings not only show that causation and effectuation both have positive main effects on venture performance, but also that their combined use further enhances positive venture outcomes. In particular, entrepreneurs who experiment with available means while also engaging in planning activities tend to realize significantly better venture performance.

Third, we move the effectuation literature forward by developing a concise agenda for future quantitative research in this tradition, emphasizing the need for better measures (Arend et al., 2015; Perry et al., 2012); for disentangling the nomological web of effectuation’s antecedents and consequences (Harms & Schiele, 2012); and for distinguishing the concept from other entrepreneurial approaches like bricolage (Baker & Nelson, 2005), improvisation (Hmieleski & Corbett, 2008), and bootstrapping (Bhide, 1991).

## **THEORY AND HYPOTHESES**

### **Effectuation and Causation**

Effectuation is a decision-making framework that guides entrepreneurial action and behavior (Sarasvathy & Dew, 2008, p. 732). Instead of using planning and prediction-oriented techniques (i.e., causation) to increase the robustness of entrepreneurial ventures to contingencies, the focus lies on the use of control strategies such as exercising flexibility and experimentation to create new products and markets (Sarasvathy, 2001, 2008). As such, effectuation is a more proactive and emergent way of dealing with uncertain environments, applying logical reasoning as a means of exerting control over the environment. In contrast, causation involves the use of logical reasoning as a predictive instrument. Causation comprises elements of strategic planning as it aims at predicting an uncertain future (Ansoff, 1979;

Mintzberg, 1978). As a decision-making logic, causation combines a strict goal orientation (Bird, 1989; Bourgeois, 1985) with a focus on profit-maximization (Friedman, 1953), competitive analysis (Porter, 1980), and avoiding surprises (Ansoff, 1980; Dutton & Ottensmeyer, 1987). In contrast, entrepreneurs who apply non-predictive control (effectuation) make use of other principles, which were first documented by Sarasvathy (2001, 2008) and colleagues (e.g., Read & Sarasvathy, 2005; Sarasvathy & Dew, 2005; Sarasvathy, Dew, Read, & Wiltbank, 2008; Wiltbank et al., 2006). These principles include creating something new by starting with available resources (i.e., intellectual, human, and social capital), limiting losses to an affordable level, creating partnerships, and letting plans evolve along the way. The main differences between causal and effectual reasoning are summarized in Table 1.

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INSERT TABLE 1 ABOUT HERE  
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While early work on effectuation and causation was concerned primarily with describing these two decision-making logics (Sarasvathy 2001; Wiltbank et al., 2006), researchers have more recently started to examine the antecedents and consequences of effectuation (Harms & Schiele, 2012) and to ask questions about the appropriate dependent variable for this stream of research (McKelvie, DeTienne, & Chandler, 2013). In the present study, we argue that effectuation and causation are connected to venture outcomes through different pathways.

### **Causation and Venture Performance**

Whereas there are a large number of studies on the virtues of strategic planning in established companies (Miller & Cardinal, 1994; Schwenk & Shrader, 1993), studies focusing explicitly on causation as an entrepreneurial decision-making logic remain scarce. One of the few notable exceptions includes Kristinsson, Candi, and Sæmundsson (2016), who explicitly include causation as a moderating decision-making logic in their study investigating the

influence of founding team diversity on idea generation and innovation. Likewise, examining R&D performance in a corporate context, Brettel, Mauer, Engelen, and Küpper (2012) found that the outcomes of intrapreneurial projects with a low level of innovation were improved when applying causal decision making. Finally, DeTienne, McKelvie, and Chandler (2015) examined causation based decision making in the context of entrepreneurial exit strategies, where entrepreneurs used a causal approach to pursue financial harvest exit strategies.

Yet there is also a closely related, and more extensive, literature on the practice-based side of causation, which centers on the use of planning for achieving predetermined goals. In this literature, the value of business planning in relation to venture performance is heavily debated (Burke, Fraser, & Greene, 2010; Chwolka & Raith, 2012; Delmar & Shane, 2003; Gruber, 2007; Honig & Samuelsson, 2014). Thus far, the overall evidence points to a positive relationship between planning and venture performance. In their meta-analysis on this relationship in the context of small and medium-sized enterprises, Mayer-Haug, Read, Brinckmann, Dew, and Grichnik (2013) show that planning activities and entrepreneurial planning skills are positively related to the growth, scale, and sales of these firms. Furthermore, Brinckmann et al.'s (2010) meta-analysis demonstrates that both a written business plan and planning as a process are beneficial for new venture performance, although the strength of the relationship depends on contextual factors like firm age and the cultural environment. In the field of strategic management too there is ample evidence that business planning positively influences venture performance in many instances (e.g., Capon, Farley, & Hoenig, 1990; Capon, Farley, & Hulbert, 1994; Miller & Cardinal, 1994).

Business planning might positively affect venture performance for different reasons. It guides action by setting objectives, the achievement of which is contingent upon predetermined plans and thorough analyses. Delmar and Shane (2003), for example, see planning as an important precursor to action in new ventures, helping entrepreneurs in the decision-



making process and allowing them to take steps toward goal achievement. Furthermore, a written business plan may enhance venture legitimacy, as entrepreneurs are able to use it to convey the feasibility and viability of their business concept to investors. Legitimacy is vital for new ventures, as it increases their chances of surviving the early stages of their life cycles by facilitating entrepreneurial resource acquisition (Delmar & Shane, 2004; Fisher, Kotha, & Lahiri, 2016). Investing time and effort in writing a business plan also signals an entrepreneur's commitment to the venture and may enhance learning by carefully thinking through all aspects of the firm; outlining structures and processes (Castrogiovanni, 1996); and collecting information on competitors, industry dynamics, and the marketplace (Frese & Gielnik, 2014). We therefore hypothesize the following:

*Hypothesis 1. An entrepreneur's use of causal reasoning is positively related to venture performance.*

### **Effectuation and Venture Performance**

A small but impactful range of studies has related effectuation to performance. Based on the outcomes of 28 independent studies, and using proxies to capture adherence to effectuation principles<sup>2</sup>, Read, Song, and Smit (2009) were among the first to report a positive and significant overall relationship between the use of effectuation and venture performance. In particular, positive links with performance were found for means-orientation, partnerships, and leveraging contingencies, but no significant relationship was found for affordable loss. Following Read et al.'s example, several studies have examined the link between effectuation (versus causation) and performance in different contexts. For example, Wiltbank, Read, Dew, and Sarasvathy (2009) found that business angel investors focusing on control (effectuation) rather than on prediction (causation) in their investment portfolios experienced fewer failures

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<sup>2</sup>For instance, to measure the effectual principle of partnerships, studies were included that examined outside members of the board, number of alliances, overlap in partners' goals, and reliance on external sources of technology.

without a reduction in the number of successes. Also, Brettel et al. (2012) show that effectuation is positively linked to process output and efficiency in highly innovative R&D projects. Furthermore, Sullivan Mort, Weerawardena, and Liesch (2012) found that entrepreneurial marketing approaches relying on effectuation lead to superior performance within born global firms. Finally, in the context of the Chinese transitional economy, Cai, Guo, Rei, and Liu (2016) provide additional support for the positive effect of effectuation on new venture performance.

Several scholars found evidence for effectuation as a moderator variable, including Mthanti and Urban (2014), who demonstrate that effectuation strengthens the relationship between entrepreneurial orientation and performance in high-tech firms. Likewise, Deligianni, Voudouris, and Lioukas (2015) show that the effectual principles of experimentation, flexibility, and pre-commitments positively moderate the relationship between product diversification and new venture performance. As the available empirical evidence suggests that firms benefit from adopting an effectual approach in different contexts, we subsequently explore the underlying mechanisms that are at play by discussing the potential linkages between the separate principles of effectuation and venture performance.

***Means-Driven Action.*** Means-driven action allows entrepreneurs to draw from and experiment with the resources at their disposal, including personal characteristics and traits, background knowledge, networks, and social contacts (Sarasvathy, 2001; Sarasvathy & Venkataraman, 2001), often leading them to make adjustments to their original business idea. When employing effectual reasoning, entrepreneurs first imagine goals that are within their reach given their set of means, and then experiment with these means to find out what goal fits best (Sarasvathy, 2001, 2008). In other words, effectual entrepreneurs experiment with their means to select business opportunities that limit potential losses to an affordable level and attract committed partners. Means-driven entrepreneurs are therefore natural experimenters. As they start by considering all available resources and proceed to experiment creatively in a low-

cost manner, we expect the ventures of means-driven entrepreneurs to perform better, as they are able to fluidly and efficiently adapt their business processes to evolving customer needs (Blank, 2013).

***Affordable Loss.*** Forecasting potential financial gains can be challenging, as the equation necessarily includes many unknown variables. Moreover, pursuing future returns requires high upfront resource commitments, making it difficult to keep operations lean and driving up the cost of potential early failure. While causation-oriented entrepreneurs frequently use approaches such as estimating net-present values to determine the feasibility of their start-up (Campbell, 1992), effectual entrepreneurs turn this process around. Focusing on their affordable loss, defined as the amount of available resources they are willing and able to lose in the start-up process, they limit their downside risk (Sarasvathy, 2001, 2008). In addition to monetary resources, the resources under consideration may include time, personal relationships, reputation, and even health. Effectual-oriented entrepreneurs also form partnerships enabling them to find low-cost ways of reaching their customers, while remaining open to adjusting their course of action (Sarasvathy, 2008, p. 88). Operating with a focus on affordable loss may therefore improve venture performance (Dew, Read, Sarasvathy, & Wiltbank, 2009). Specifically, entrepreneurs can improve venture performance when they put an upper bound on losses, thus limiting costs and increasing efficiency.

***Partnerships.*** To fully exploit the means available to them, effectual entrepreneurs seek to create win-win situations in which intrinsically motivated outsiders voluntarily commit their resources to jointly build a successful firm (Sarasvathy, 2001, 2008). Such stakeholders are self-selected, commit to the extent that they want to contribute to the new venture, and may include people (e.g., customers, suppliers, technology enthusiasts) or organizations (e.g., financial institutions, universities; Sarasvathy, 2008). In working with partners who are willing to help shape future outcomes, uncertainty is reduced, as there is the opportunity for risk sharing

(Eisenhardt & Schoonhoven, 1996). Effectual partnerships are built on the assumption that, in uncertain environments, “the only way for each party in the relationship to benefit is by making small (affordable-loss based) but credible commitments to a joint course of action even if each is unsure of the other’s trustworthiness down the road” (Sarasvathy & Dew, 2008, p. 728). Without a pre-determined goal to achieve, effectual entrepreneurs can draw on valuable resources that would otherwise not have been available (Alvarez & Busenitz, 2001; Barney, 1991). Shaping the venture’s future through combined action may thus lead to better performance (Sarasvathy, 2008).

*Leveraging Contingencies.* By embracing the unexpected, that is, making good use of contingencies that arise when starting a new venture, effectual entrepreneurs remain flexible. Whether these contingencies are unanticipated events, accidental meetings, or the disclosure of new information, surprises are seen as opportunities. Unforeseen occurrences that may seem disadvantageous at first can be transformed to produce favorable outcomes (Sarasvathy, 2008). The ability to leverage contingencies can benefit effectual entrepreneurs who see unexpected events as (potential) new resources. Whereas positive surprises naturally work to an entrepreneur’s advantage, negative surprises can also be leveraged if the entrepreneur can adapt to the new circumstances faster or better than competitors (Harmeling, 2011). Read, Sarasvathy, Dew, Wiltbank, and Ohlsson (2011, p. 144) refer to the “contingency path of novel outcomes”, implying that entrepreneurs who embrace contingencies may experience better venture performance. This adaptive behavior can be particularly advantageous when other companies are less flexible because they stick to their business plans more rigidly, and are therefore less able to learn or benefit from unforeseen incidents (Nadkarni & Narayanan, 2007; Warren, Moore, & Cardona, 2002). We therefore posit the following hypothesis:

*Hypothesis 2. An entrepreneur’s use of effectual reasoning is positively related to venture performance.*

## **Synergistic Effects of Effectuation and Causation**

While some researchers see effectuation and causation as opposite ends of a dichotomized construct (Brettel et al., 2012), others stress that they should not be seen as two sides of a continuum (Perry et al., 2012). We follow the latter research tradition, in which the two logics are not regarded as opposites, but are seen as orthogonal in nature. Sarasvathy (2001, p. 245) states that “both decision-making logics are integral parts of human reasoning and can occur simultaneously, overlapping and intertwining over different contexts of decisions and actions”, implying that causation and effectuation should not be seen as opposite poles. Similarly, Sarasvathy (p. 249) noted that “effectuation processes are not posited here as ‘better’ or ‘more efficient’ than causation processes in creating artifacts such as firms”. Although neither causation nor effectuation is thus considered a superior approach in the *process* of creating a new firm, performance *outcomes* may vary, depending upon how the two approaches are combined. Indeed, effectuation and causation can be seen as complementary logics, allowing entrepreneurs to cope with different contingencies throughout the life cycle of their ventures. The ability of effectuation processes to contribute to venture performance might therefore well be contingent upon the presence of at least a threshold level of causation processes, and the other way around. Moreover, depending on the level of uncertainty surrounding any given decision that needs to be made, either causation (in case of low uncertainty) or effectuation (in case of high uncertainty) would be preferable in that specific context. New venture founding involves a great number of decisions to be taken, with each decision comprising a different level of contextual uncertainty. We propose that causal reasoning is best used for decisions involving predictable outcomes, whereas effectual reasoning is best applied to unpredictable situations.<sup>3</sup> Saliently, venture performance appears

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<sup>3</sup> We thank our editor for suggesting contextual uncertainty as an important contingency factor determining the relative value of causal and effectual decision-making logics for individual entrepreneurial decisions.

to benefit from the involvement of entrepreneurs who have both decision-making logics in their repertoires.

Although the combined use of effectuation and causation by entrepreneurs has attracted the interest of numerous researchers (e.g., Evald & Senderovitz, 2013; Maine et al., 2015; Nummela et al., 2014; Reymen et al., 2015; Sitoh et al., 2014), to our knowledge studies that empirically test for interactive effects of these two decision frameworks on venture performance are currently absent. Interestingly, Brinckmann et al. (2010) recommend the combined use of a dynamic practice of planning (causal approach) and doing (effectual approach) for new and established small firms. They suggest that entrepreneurs can enhance their planning activities with the information gained from experience, thus letting plans evolve depending on feedback from the environment. This highlights the temporal aspect in the discussion of the effectuation-causation relationship, demonstrating that planning and execution can take place concurrently, sequentially, or recursively. Examining new product innovation processes in small firms, Berends et al. (2014) show that effectuation is mainly used in the early venture stages, while causation is emphasized in later stages. Although the aforementioned studies acknowledge the feasibility and desirability of employing causal and effectual decision-making logics, they do not empirically examine the implications for venture performance. In the remainder of this paper, we set out to determine how the combined use of causal and effectual logics can be beneficial to venture performance.

Our point of departure is that, within any new venture, specific business functions require different approaches. To the extent that members of the founding team have diverse backgrounds, they may differ in their proclivity toward either causal or effectual decision-making approaches, and problem-solving styles (Nummela et al., 2014). Such diversity may lead to mutual learning outcomes, improved creativity, and more innovativeness, which will benefit the firm (Chandler & Lyon, 2001; Horwitz & Horwitz, 2007; Maznevski, 1994). Timing

is also important when considering the joint use of causation and effectuation (Reymen et al., 2015) and their combined contribution to venture performance. When entrepreneurs or entrepreneurial teams are able to switch from one decision logic to the other, depending on the uncertainty level surrounding the decision to be made, thus always selecting the decision making approach that fits the situation best, the new venture is likely to profit.

Business tasks can thus be approached using both logics in tandem (Sitoh et al., 2014). While using a causation-oriented approach to introduce general structures and action plans, an entrepreneur can concurrently use an effectuation-oriented approach to explore a wider range of options within the broad boundaries set by prior planning efforts (Reymen et al., 2015). This allows the entrepreneur to enjoy the benefits of both approaches. In particular, designing business strategies based on long-term objectives may be combined with short-term experiments, such as making changes to product features (Frese, 2009). While the entrepreneur draws on the currently available means to shape the new venture along the way, the identification of future goals helps determine growth ambitions (Frese et al., 2007). This way, entrepreneurs are able to reap the benefits from both approaches, employing causation and effectuation concurrently to strengthen venture performance.

The same reasoning applies to financial decisions. When entrepreneurs make profitability forecasts to support growth decisions, current resources might only be committed to the process if the entrepreneurs can afford using (and losing) them. By considering upward potential alongside protection from downside loss, entrepreneurs can make better informed and more balanced decisions, which may positively impact venture performance.

Furthermore, the combined use of alliances and partnerships may also have synergistic effects. Effectual entrepreneurs work together with committed stakeholders to shape the future of their ventures, but causal planning mechanisms can provide these entrepreneurs with more focus in the process (Rothaermel & Deeds, 2006). Agreements made with stakeholders reduce

uncertainty about the future of the new venture, while at the same time resources and networks can be shared with alliance members (Teng, 2007). As a consequence, venture performance may increase as the pool of new resources and options widens.

Finally, the flexibility that effectual thinking promotes can be combined with the careful weighing of the costs and benefits associated with each option explored in the causal approach. The entrepreneur can take advantage of opportunities that arise due to unexpected events while still focusing on a long-term goal (Zheng & Mai, 2013). Plans serve as a guideline that can be deviated from, while still providing an underlying structure, when new information creates awareness about and access to new opportunities. Furthermore, activities supporting the planning process, such as developing action plans that are not necessarily transformed into formal documents, may enhance the positive effect of goal setting on venture creation and outcomes (Gielnik & Frese, 2013). Hence, venture performance benefits from the mutually reinforcing effect that flexibility has in some areas and rigidity in others.

In conclusion, using causation and effectuation in tandem can lead to synergies, especially when the benefits of both decision-making logics are combined to strengthen venture performance. Thus, we hypothesize that a strict focus on either causation or effectuation will be less effective than a balanced use of both approaches, as it allows entrepreneurs to optimally cope with a wider range of contingencies when adjusting their decision-making to the level of contextual uncertainty surrounding that decision. Accordingly, we formulate the following hypothesis:

*Hypothesis 3. An entrepreneur's joint use of causal and effectual reasoning will have a positive interactive effect on venture performance.*

Figure 2 summarizes the direct and interactive effects we propose causation and effectuation to have on venture performance.

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INSERT FIGURE 2 ABOUT HERE  
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## METHODOLOGY

### Data and Sample

Our data were collected as part of the Global University Entrepreneurial Spirit Students' Survey (GUESSS), an international research project coordinated by the Swiss Institute for Small Business and Entrepreneurship at the University of St. Gallen. The survey investigates entrepreneurial attitudes, intentions, and activities of students enrolled in institutions of higher education. The project is not limited to students following entrepreneurship programs or classes, and includes students at different education levels (i.e., graduate, undergraduate, doctoral) and from different programs (i.e., business and economics, natural sciences, social sciences). Country coordinators were appointed to contact and "recruit" universities, and participating universities subsequently use their own databases to invite students to participate via an email with a link to the online survey.<sup>4</sup>

We use the international GUESSS data collected between March and May 2011 from 489 universities in 26 countries, resulting in a data base of 93,265 respondents. In most countries, data were collected in two rounds (i.e., initial invitation and reminder), and the survey was translated into the local language. The 2011 GUESSS consists of different parts, including questions all respondents must answer about personal background, university context, career choice intentions and motives, and family background. Specific groups of respondents, that is, intentional founders, active entrepreneurs, and students whose parents have a family business, are subsequently asked to answer additional questions.<sup>5</sup>

Student entrepreneurs were identified with the following question: "Please indicate if, and how seriously, you have been thinking about founding your own company." Answer categories include: (1) Never, (2) Sketchily, (3) Repeatedly, (4) Relatively concrete, (5) I have

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<sup>4</sup> For more background information on the GUESSS project, we would like to refer the reader to the website [www.guesssurvey.org](http://www.guesssurvey.org).

<sup>5</sup> See Sieger, Fueglistaller, and Zellweger (2011) for more information on the GUESSS outcomes.

made an explicit decision to found a company, (6) I have a concrete time plan when to do the different steps for founding, (7) I have already started with the realization, (8) I am already self-employed in a firm I founded myself, and (9) I have already founded more than one company, and am active in at least one of them. Participants answering (8) or (9) are classified as entrepreneurs. Being identified as an entrepreneur, the respondent was then asked questions about the founding process and characteristics and performance of the company. On average, 2.4% of all surveyed students in the different countries were self-employed.

Other researchers have used the GUESS data for different purposes, for example to study family businesses (Zellweger, Richards, Sieger, & Patel, 2016) or career choice intentions (Sieger & Monsen, 2015).

Our sample includes 2,207 student entrepreneurs from 25 countries<sup>6</sup> who run their own venture while following a university education. About a fourth (23.7 %) of our sample consists of entrepreneurs who founded more than one venture in the past and thus can be considered serial entrepreneurs. The final sample, excluding missing data for the dependent, independent, and control variables, consists of 1,453 observations.

The average age of the entrepreneurs in the final sample is 31 years. Roughly two-thirds of the respondents are male (69%). The self-reported median annual sales in 2010 amounted to 12,539 Euro with an average of 447,934 Euro. However, only 26.4% of the respondents managed to generate more than 50,000 Euro in sales. Almost half of our sample did not employ any staff (49.1%), 15.4% had one employee, 10.5% had two employees, and the remainder employed three or more people (25%). About one third (35.4%) of the ventures in our sample is younger than 2 years, and roughly another third (29.9%) is between 2 and 5 years old. The

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<sup>6</sup> These countries include: Argentina, Austria, Belgium, Brazil, Chile, China, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Liechtenstein, Luxembourg, Mexico, Netherlands, Pakistan, Portugal, Romania, Russia, Singapore, South Africa, Switzerland, and the United Kingdom. Although Japan participated in the study, this country did not report student entrepreneurs.

remainder (34.7%) are ventures of 5 years and older. Most firms operate in the service industry (51.8%), while agriculture, forestry, and fishing is least common (3%).

## Measures

***Venture Performance.*** The measurement of the dependent variable was adapted from Eddleston, Kellermanns, and Sarathy (2008). Respondents were asked to rate the performance of their business since its establishment in comparison to their competitors on a 7-point Likert scale (1=worse, 4=equal, 7=better). Dess and Robinson (1984) suggest that subjective ratings of company performance are closely related to objective performance measures, and may be used when objective data are not available.<sup>7</sup> We constructed an index of performance by taking an average of the results across three dimensions, namely development of sales, market share, and profit ( $\alpha = .88$ ).

***Causation and Effectuation.*** The measures for the independent variables were adapted from Chandler et al. (2011), who validated causation and effectuation measures with the help of exploratory and confirmatory factor analysis, showing content validity, face validity, predictive validity, and construct validity. We follow the terminology used by Chandler et al., which differs slightly from that originally proposed by Sarasvathy (2001), but relates to a scale that has been validated for collecting survey data. See Appendix 1 for a comparison of terminologies.

Respondents answered a series of questions about how they laid the foundation for their company by rating different founding strategies on a 7-point Likert scale (1=strongly disagree, 7=strongly agree). Our exploratory factor analysis yielded a one-factor solution for the causation items and a four-factor solution for the effectuation items. These latter four factors corresponded to the effectuation dimensions of experimentation, affordable loss, pre-

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<sup>7</sup> In their study, Eddleston et al. (2008) also refer to Love, Priem, and Lumpkin (2002) as well as Venkatraman and Ramanujam (1987) who support this claim and conclude that subjective measures and objective measures of performance are strongly correlated.

commitment, and flexibility (see Appendix 2). We constructed the scale variables by calculating average scores for the items representing the underlying dimensions. Cronbach's alpha was used to assess the internal consistency of the scales. Nunnally (1978) proposes a value of at least 0.7 for a reliable scale, a requirement that is satisfied in our study. The unidimensional construct of causation was measured using a 5-item scale ( $\alpha = .90$ ). Effectuation was measured along its four dimensions: using a 3-item scale for experimentation ( $\alpha = .76$ )<sup>8</sup>, a 3-item scale for affordable loss ( $\alpha = .87$ ), a 2-item scale for pre-commitment ( $\alpha = .79$ ) and a 4-item scale for flexibility ( $\alpha = .76$ ; see Appendix 3). We also constructed an aggregated effectuation measure that included all items ( $\alpha = .88$ ).

*Control Variables.* We control for several background characteristics of the entrepreneur that are likely to influence venture performance, including the entrepreneur's age, gender, commitment, prior experience, and parental role models. The age of the entrepreneur may capture endowments of human capital, such as work and life experience (Cowling & Taylor, 2001; Gimeno, Folta, Cooper & Woo, 1997). The literature has furthermore reported gender differences in venture performance, suggesting that female entrepreneurs "underperform" as compared to male entrepreneurs, at least on financial metrics (e.g., Du Rietz & Henrekson, 2000; Fairlie & Robb, 2009). We also control for the degree of commitment, using a measure for the average number of weekly hours spent by the entrepreneur on company-related activities. We do so because we expect that entrepreneurs who put more time and effort into their ventures will experience better venture performance (Meyer, Stanley, Herscovitch, & Topolnytsky, 2002).

We account for experience effects by including measures for relevant work experience, entrepreneurial experience, and parental role models. Research has shown that industry-specific

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<sup>8</sup> It should be noted that one item from the GUESSS database has been deleted, namely a reverse-phrased question for the inverse of the item asking whether the product/service provided is essentially the same as originally conceptualized. Even after recoding the item to match the direction of the other questions in the scale, it turned out to be problematic ( $\alpha = .66$ ). As this item is tautological and does not add value to the scale, it was removed.

knowledge and work experience are important for venture performance (e.g., Lee & Tsang, 2001; Van Praag, 2003). We captured work experience as the total number of years the entrepreneur had worked in related jobs before founding his or her firm. We also included a control variable capturing whether the entrepreneur had founded more than one venture in the past (0=no, 1=yes), thus possessing entrepreneurial experience. In addition, (prospective) entrepreneurs can learn about the “nuts and bolts” of venturing from the example set by entrepreneurial parents. Indeed, prior studies have found that being raised in an entrepreneurial household is positively associated with new venture success (e.g., Duchesneau & Gartner, 1990; Gimeno, Folta, Cooper & Woo, 1997). We control for parental role modeling effects by including a variable indicating whether or not the student entrepreneur had at least one self-employed parent (0=none, 1=at least one).

In addition to individual-level factors, we include several firm-specific (dummy) variables that are commonly associated with firm outcomes. Firm age was measured as the time passed (in years) since the entrepreneur incurred the first expenses for his/her company. Firm size was measured in term of the firm’s current number of FTE employees. We also included dummy variables (0=no, 1=yes) to control for industry effects. We used the U.S. Standard Industrial Classification (SIC) to group firms as follows: agriculture, forestry and fishing (SIC0); construction and manufacturing (SIC1/2/3); transportation and communications/information technology (SIC4); wholesale and retail trade (SIC5); finance, insurance and real estate (SIC6); and other (SIC9). We used businesses in services (SIC7/8) as our reference category.

Finally, to account for country-level cultural effects, we constructed country clusters based on geographical and cultural proximity (cf. Ronen & Shenkar, 1985). Dummy variables (0=no, 1=yes) were included for Northern Europe (Finland), Western Europe (Belgium, France, Great Britain, Ireland, Netherlands), Eastern Europe (Russia), Southern/Southeast Europe

(Greece, Portugal, Romania), Latin America (Argentina, Brazil, Chile, Mexico), Africa (South Africa), and Asia (China, Singapore)<sup>9</sup>. Central Europe (Austria, Estonia, Germany, Hungary, Liechtenstein, Luxembourg, Switzerland) was used as reference category.

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INSERT TABLE 2 ABOUT HERE  
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## RESULTS

### Hypothesis Testing

We tested our hypotheses using hierarchical ordinary least squares estimations. With a variance inflation factor (VIF) not greater than 2 for the explanatory variables, there was no reason to suspect multicollinearity problems. While Neter, Wasserman, and Kutner (1990) suggest a cut-off value of 10, we stuck to a more conservative threshold (Belsley, Kuh, & Welsch, 1980; O'Brien, 2007). The low to moderate magnitude of the correlations reported in Table 2 also indicates that distortion of our results due to multicollinearity issues is not likely.

The descriptive statistics reported in Table 2 show that, on average, respondents reported equal or slightly higher performance as compared to their competitors ( $M = 4.28$ ). Effectuation ( $M = 4.66$ ) is used more often than causation ( $M = 4.28$ ). A paired t-test reveals that this difference is statistically significant ( $p < .01$ ). When we regressed venture performance on these two decision logics, however (Table 3, Model II), the effect of causation ( $t = 7.10$ ) turned out to be almost twice as large as the effect of effectuation ( $t = 4.10$ ). We furthermore find a strong positive correlation between effectuation and causation ( $r = .58, p < .01$ ). In fact, the causation construct correlates more strongly with effectuation than with any other variable. This is an important precursor to a valid test of hypothesis 3, as it suggests that entrepreneurs indeed frequently use the two decision logics in tandem ( $r = .58; p < .01$ ). The two constructs

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<sup>9</sup> Please note that the dummy variable for the independent cultural block (Pakistan), did not include any valid cases for analysis after the pairwise deletion of cases with missing values.

are thus not independent, and certainly not one another's inverse. We will return to this finding in the discussion. For work experience and firm size, the standard deviation is relatively high compared to the mean score. This is because in both cases almost half of the sample reported to have no work experience (44.8 %) and no employees (49.1 %).

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INSERT TABLE 3 ABOUT HERE  
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Our regression results can be found in Table 3. The first model includes only control variables. We added the independent variables causation and effectuation in the second model, the interaction term between effectuation and causation in the third model, and the individual effectuation dimensions (experimentation, affordable loss, pre-commitment, and flexibility) in the fourth model. Finally, the interaction terms between causation and the four effectuation dimensions were added in the fifth and last model.

The *F*-tests capturing the overall fit of the regression models to the underlying data are all statistically significant, as is the change in *F*-statistics between models. Our results support hypothesis 1, as causation significantly predicts venture performance ( $\beta = .23, p < .001$ ; Model II). Causation remains the strongest predictor, even when the interaction term with the effectuation variable is included ( $\beta = .21, p < .001$ ; Model IV). We also find support for hypothesis 2. Effectuation is positively related to venture performance ( $\beta = .12, p < .001$ ; Model II). The mechanisms driving this relationship are affordable loss ( $\beta = -.06, p < .05$ ; Model IV); pre-commitment ( $\beta = .13, p < .001$ ; Model IV) and flexibility ( $\beta = .10, p < .001$ ; Model IV). Whereas pre-commitment and flexibility are positively related to venture performance, affordable loss is negatively related to our dependent variable. Contrary to our expectations, we thus find that limiting downward risk hurts rather than helps venture performance. Finally, experimentation is not significantly related to venture performance ( $\beta = .03, p > .10$ ; Model IV).

We find support for hypothesis 3, in that effectuation and causation can be seen as mutually reinforcing: the interactive effect of causation and effectuation on venture performance is positive ( $\beta = .09, p < .001$ ; Model III & Figure 1). Moreover, the finding that the two logics are synergistic in nature (i.e., that the combination of effectuation and causation is stronger than the sum of its parts) is further strengthened by the fact that the sum of the effect sizes of the main effects equals 0.349 (Model II), while the effect sizes of the main effects plus that of the interaction term sum up to 0.438 (Model III).

Next, we examined the four interaction terms between causation and the disaggregated effectuation dimensions to single out the driving mechanisms behind our findings for Hypothesis 3. The combined use of causation and experimentation was positively associated with venture performance ( $\beta = .08, p < .01$ ; Model V), while the other interaction terms did not yield statistically significant results (causation x affordable loss:  $\beta = .03, p > .05$ ; causation x pre-commitment:  $\beta = .03, p > .05$ ; causation x flexibility:  $\beta = -.02, p > .05$ ; Model V). We return to these fine-grained findings in the Discussion section. See Table 4 for an overview of our hypotheses and a summary of our results.

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INSERT FIGURE 1 AND TABLE 4 ABOUT HERE  
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### **Control Variables and Additional Analyses**

For our control variables (Model I), we found a negative relationship between the entrepreneur's age and venture performance ( $\beta = -.16, p < .001$ ), indicating that younger entrepreneurs are more likely to have better performing firms. An entrepreneur's commitment to the venture is positively related to performance ( $\beta = .13, p < .001$ ). Founders who spend more time on their new businesses thus appear to harvest the fruits of their labor. Similarly, previous work experience ( $\beta = .09, p < .01$ ) and entrepreneurial experience (i.e., having founded a venture before;  $\beta = .06, p < .05$ ) are both positively associated with venture performance.



Finally, firm age ( $\beta = .15, p < .001$ ) as well as firm size ( $\beta = .14, p < .001$ ) are positively related to performance. Being female ( $\beta = .04, p > .05$ ) and having self-employed parents ( $\beta = .03, p > .05$ ) are not significantly related to performance.

To further corroborate our hypothesized results, we categorized our respondents into three groups, based on their relative scores on the effectuation and causation scales.<sup>10</sup> Using the arithmetic mean of their scores on the 7-point Likert items underlying both scales, we defined the group “mainly effectual” entrepreneurs as those individuals who scored at least one and a half points higher on the effectuation than on the causation variable. Similarly, we defined the group of “mainly causal” entrepreneurs as those respondents who scored at least one and a half points higher on the causation than on the effectuation variable. The remaining individuals were assigned to the group of “balanced use” entrepreneurs by virtue of them reporting causation and effectuation scores that were less than one and a half points apart. For this analysis, due to less sample attrition, we had 1,999 responses available. The majority of our respondents were in the “balanced use” category, namely 73.5%. The “mainly causal” category comprised 6.8% of the sample, while the “mainly effectual” category captured the remaining 19.7%. In a separate regression analysis in which we used the “balanced use” variable as our reference category, the ventures of the entrepreneurs in the “mainly effectual” category significantly underperformed the benchmark ( $\beta = -.12, p < .001$ ), whereas the “mainly causal” entrepreneurs were on par with it ( $\beta = .01, p > .05$ ). Thus, entrepreneurs who regularly use effectual decision-making might be able to improve the performance of their ventures by increasing the degree in which they also use causal reasoning.

For reasons of brevity and readability, we chose not to include the results for our industry dummy variables and country cluster variables in Table 3. Both sets of variables

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<sup>10</sup> We thank one of our reviewers for suggesting this additional analysis. Regression results can be obtained from the authors.

furthermore yielded few significant results.<sup>11</sup> The only industry dummy yielding a significant positive relationship with performance is SIC 6: finance, insurance and real estate ( $\beta = .07, p < .05$ ). The two country clusters showing a positive and significant association with performance are Latin America ( $\beta = .13, p < .001$ ) and Southern/Southeast Europe ( $\beta = .06, p < .05$ ), whereas observations from the Northern European cluster were underperforming the reference category ( $\beta = -.06, p < .05$ ). We conclude that there are no major venture performance differences across the industries and regions represented in our data.

In our study, we relied on self-reported data for several reasons. First, obtaining independent and dependent variables from different sources was not possible, due to the international scope of the research. Second, our theoretical interest lies in entrepreneurial decision-making logics, data on which have to be obtained from research participants directly. Third, objective performance data were unavailable for most of the firms in our sample, as young and small ventures are typically not required to publically report their financials. Due to this reliance on self-reported data, we had to take steps to minimize the potential impact of common method bias.

In detecting and diagnosing the effects of common method variance, we followed procedures recently used by other authors whose work was published in *Entrepreneurship Theory and Practice* (e.g., Lanivich, 2015; Patel & Conklin, 2012; Stevens, Moray, & Bruneel, 2015). First, we believe that participants were unable to logically connect independent and dependent variables through a complex research design such as the interaction effects investigated in our study (Brockner, Siegel, Daly, Tyler, & Martin, 1997; Chang, Van Witteloostuijn, & Eden, 2010; Slater & Atuahene-Gima, 2004). Second, the recommendations by Podsakoff, MacKenzie, Lee, and Podsakoff (2003) on procedural techniques for controlling for common method bias were carefully applied within the context of the GUESSS project. The

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<sup>11</sup> A table containing the complete regression results can be obtained from the authors.

international coordinating GUESSSS team clearly communicated guidelines to be followed with regard to the protection of respondents' anonymity, and a standardized invitation was sent out to the country coordinators and participating universities including a notification ensuring that all answers would be treated confidentially. In addition, entrepreneurs filled out the questionnaire online, and were not in direct contact with the researchers. Therefore, any socially desirable answers that could be inferred from the study context or the researchers themselves through personal contact were eliminated.

We tested for common method variance after the data were collected, although statistical *post hoc* analyses and controls for common method bias should be treated with caution (Conway & Lance, 2010). We used Harman's (1967) single-factor test and performed an unrotated principal component factor analysis. Problems with common method variance are likely to be present when one single factor can be detected or when the majority of covariance can be explained by one factor (e.g., Podsakoff & Organ, 1986). The results of our analysis revealed several factors with an eigenvalue greater than 1, with the largest factor accounting for only 33.15% of the total variance. Although no single factor was found and while the largest factor did not account for the majority of the total variance, it is still possible for common method bias to be present. Hence, as Conway and Lance recommended, we also assessed construct validity to uncover the presence of method effects. As the maximum shared variance (MSV) was smaller than the average shared variance (ASV), our constructs all possessed discriminant validity. Also, the ASV was smaller than the average variance extracted (AVE) and the square root of the AVE was greater than the inter-construct correlations (Hair, Black, Babin, & Anderson, 2010). There may not be convergent validity if the AVE is less than 0.5, which was the case for experimentation (AVE = 0.44), pre-commitment (AVE = 0.49), and flexibility (AVE = 0.44). However, these values are too close to the proposed threshold to be of major concern. In conclusion, we are confident that, given the outcome of our procedural precaution

and statistical tests, common method bias should not be a major concern when interpreting our results.

## DISCUSSION

### Implications

*Assessing the Relationship Between Effectuation and Causation.* An important first contribution of our study involves the exploration of the conceptual and empirical interrelationships between effectuation and causation. Acknowledging that the effectual approach is not inherently superior to causation, we responded to Sarasvathy's (2001, p. 249) call to investigate the circumstances under which the use of effectuation and/or causation are conducive to venture performance. We found that effectuation is positively related to venture performance, in particular when the entrepreneur applies the effectual principles of pre-commitment and flexibility. While it seems intuitive that venture performance depends on the extent to which entrepreneurs are flexible, proactively pursue new opportunities, and adapt their businesses to a changing business environment, our findings emphasize the importance of securing pre-commitments from third parties. It is vital for entrepreneurs to obtain commitments to their new venture from self-selected stakeholders.

To better understand the mechanisms behind the relationship between performance and the creation of pre-commitments, we draw on the notion of the skilled social actor put forward by Fligstein (1997, 2001). Skilled social actors are individuals who cooperate with others by relating to them on an empathetic level, enabling them to bring forward compelling reasons for continued cooperation. Working with stakeholders who self-commit to the new venture, the perspective of the skilled social actor is highly relevant to understand the essence of effectual entrepreneurship. In line with the concept of effectual entrepreneurship, Fligstein (2001, p. 113) argues that skilled actors of the effectual kind "do not have individual fixed interests but instead focus on the evolving collective ends. They keep their goals somewhat open ended, and they

are prepared to take what the system will give.” Effectual entrepreneurs who successfully engage with others and succeed in securing pre-commitments may be regarded as having highly developed social skills. Whether the pre-commitments are from suppliers investing in the co-creation of the product or from customers engaged in promoting it, their ventures profit from this cooperation. In our study, we demonstrate that ventures relying on stakeholder pre-commitments perform better. In the future, additional research is needed to create a deeper understanding of the behavior of skilled social actors and of the role they play in the partnership principle of effectuation. For practitioners, our findings show that focusing on co-creation with stakeholders remains an essential part of their daily business operations. Not only should entrepreneurs look out for partnerships, they should also be aware of and attempt to embrace all kinds of unexpected outcomes that come from jointly shaping the future path of their ventures, and thus adopt the flexibility principle of effectuation. Such outcomes may include encounters with a product enthusiast who suggests pursuing a new target market, or negative reviews in a major press outlet convincing the entrepreneur to work together with the critical expert to redesign certain product features.

Furthermore, our findings show that the ventures of entrepreneurs who behave in a less loss-averse fashion perform better. This negative effect of affordable loss on venture performance, while surprising at first sight, is worth investigating in more detail. Are ventures better off when entrepreneurs focus less on risking only what they are willing to lose? While causal entrepreneurs focus on acquiring the necessary means to achieve pre-determined goals, effectual entrepreneurs are cautious not to commit more resources than they can bear to lose. This allows them to fail cheap and offers them the opportunity for a rapid restart, which might be beneficial to entrepreneurial learning or serial firm development, but which does not necessarily lead to better venture performance. On the other hand, a substantive literature points out that resource commitments are positively related to performance (e.g., George, 2005;

Wiklund & Shepherd, 2003). The value of applying the affordable loss principle therefore lies in loss avoidance and not in increased performance, making a negative impact of affordable loss on venture performance more plausible.<sup>12</sup> For entrepreneurs who want to convince investors it is important to keep in mind that, although applying the affordable loss principle might be beneficial for starting a venture, at a later stage a more causal approach may be preferred. Therefore, when seeking investments, the entrepreneur may also want to rely (at least to some extent) on profit forecasts and deliberate sales planning. This tactic does not only contribute to firm performance, but may also persuade investors by signaling the willingness and ability to pursue firm growth future life-cycle stages (Fisher et al., 2016).

Ultimately, we cannot disregard the beneficial effects of causation on venture performance. Our findings are in line with the abundant literature pointing at the advantages of new venture planning (e.g., Brinckmann et al., 2010; Burke et al., 2010; Chwolka & Raith, 2012; Delmar & Shane, 2003; Gruber, 2007). But we should not infer from these findings that causation is always the more effective entrepreneurial logic for safeguarding venture performance. While previous research has suggested that business planning has a largely positive effect on performance, it also acknowledges the boundary conditions beyond which these findings do not hold. For instance, Gruber stresses that, in highly dynamic environments, entrepreneurs can profit from planning activities combined with speeding up the planning task. We would welcome future studies explicating these boundary conditions further.

***Linking Causation and Effectuation to Venture Performance.*** A second contribution of our work is the insight it provides into the underlying mechanisms linking effectuation and causation to venture performance. As shown empirically, the two constructs are positively correlated and therefore not independent. In fact, we demonstrate that the two logics are mutually reinforcing and contribute jointly to venture performance. Surprisingly, we find that

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<sup>12</sup> We would like to thank our editor for pointing out this excellent interpretation of our results concerning the affordable loss principle.

only the effectual principle of experimentation significantly strengthens the relationship between causation and performance. In light of this finding, it may be interesting for entrepreneurs to consider applying a “planning effectuator” approach. Although this seems to be a contradiction in terms, an entrepreneur who designs business strategies for a new venture may still benefit from experimenting with the product offering and making use of the resources at hand (e.g., identity, knowledge, networks). While the effectual approach tends to target the product of the firm, the planning approach allows the entrepreneur to map the general direction in which the business is heading. From a practitioner perspective, entrepreneurs are advised to focus on effectuation while remaining committed to planning mechanisms. Financially healthy firms will continue to use planning, but combine this with an effectual approach. An example is an entrepreneur who may have a desired production schedule for the next year, while at the same time changing the key features of the product based on customer feedback.

***Future Research.*** As a third and final contribution to advance the effectuation literature, we make a plea for focusing on three additional matters in future research. First, we emphasize the need to refine existing, validated measurement scales. Although a detailed discussion of methodological issues of existing scales is beyond the scope of our study, we would like to point out that future research would benefit from further refinement of the effectuation measures developed in the pioneering study by Chandler et al. (2011). They operationalized effectuation as “a formative second-order construct consisting of reflective first-order sub-components” (p. 382). In this conceptualization, effectuation is made up of several decision-making logics representing separate formative dimensions of the effectuation construct. The individual dimensions themselves (i.e., experimentation, affordable loss, pre-commitment, flexibility), however, are treated as reflective in nature (Perry et al., 2012, p. 852). In our view, future research would benefit from refining or expanding the reflective items that ultimately make up the effectuation construct. For instance, the items coding for affordable loss capture

financial resources well, but there is still room to also include the other resources the entrepreneur commits to the founding process. For example, Daniel et al. (2014) recommend investigating social losses. In addition, we encourage researchers to closely examine dimensions in the causation construct. Although causation potentially consists of as many dimensions as effectuation, this is often neglected in prior research.

Second, more work is needed to disentangle the nomological web of antecedents and consequences of effectuation (Harms & Schiele, 2012). In addition to creating more clarity with regard to the construct itself, the concept of effectuation may be better positioned in its network of sources, manifestations, and interrelationships. For instance, next to examining the role of individual-level characteristics such as entrepreneurial self-efficacy (Engel, Dimitrova, Khapova, & Elfring, 2014) or identity (Alsos, Clausen, Hytti, & Solvoll, 2016) within the context of effectuation research, future research could look at antecedents of effectuation at the team or firm level. Also, more research on each of the effectual principles is desirable. For example, while Dew, Sarasvathy, Read, and Wiltbank (2009) examined the affordable loss principle in more detail, other researchers could focus on an entrepreneurs' ability of leveraging contingencies or skillful building of partnerships. Finally, and latching on to our findings concerning the negative relationship between adherence to the affordable loss principle and venture performance, there is a continued need for future studies reflecting on what the appropriate dependent variable for effectuation research ought to be (McKelvie et al., 2013).

Third, more research is needed to further distinguish the concept of effectuation from other entrepreneurial behaviors like bricolage (Baker & Nelson, 2005), improvisation (Hmieleski & Corbett, 2008), and bootstrapping (Bhide, 1991). Fisher (2012) made a first step in this direction by examining entrepreneurial bricolage in comparison with effectuation and causation. Similarly, Welter, Mauer, and Wuebker (2016) discussed effectuation and bricolage in the opportunity creation framework, and in their case study Evers and O'Gorman (2011)



examined effectuation and improvisation in the context of the internationalization process. Still, additional research is needed to further establish the distinctiveness of the effectuation concept. For example, to what extent is improvisation – the convergence of design and execution (Miner, Bassoff, & Moorman, 2001) – an integral part of employing effectual logics? And how does bootstrapping, which relies on the use of limited resources, fit with the means-orientation of effectual entrepreneurs and connect with the affordable loss principle? Future work on the construct clarity of effectuation should address these questions head-on.

*Limitations.* As with all empirical work, we acknowledge that there are limitations present in our study. As we are working with cross-sectional data, causality cannot be inferred. Although it is conceivable that entrepreneurs with better performing firms pursue more causal strategies, our data does not allow us to draw conclusions about the order of events. Due to the cross-sectional nature of our research design, we had to ask entrepreneurs about two different (temporal) instances in one questionnaire (i.e., asking them about the approach they chose at the time of venture founding, as well as about current venture performance). Other time-related issues may, however, be more prominent. While we assume the complementarity of the two approaches during the whole venturing process, the sequential use of causation and effectuation is not traceable within our data. That is, the “planning effectuator” might experiment in the early stages of the venture and gradually switch to a more causal approach in later stages. Additionally, recall bias can exist for the independent variables, although we believe that the magnitude of this bias will be limited, given that the ventures in our sample are, on average, five years old. The ability to accurately judge the use of a certain decision-making approach is not likely to depend on details that are difficult to remember after this period of time. Future research, however, should consider longitudinal research designs when linking causation and effectuation to venture performance. It would be advisable to follow founders from the inception of their new venture to later stages, when relevant short-term performance outcomes

(e.g., first sale or reaching the break-even point) and long-term performance outcomes (e.g., hire of first employees or consecutive annual sales) can be measured. Questions about the venturing process can then be asked along the way to prevent recall bias.

Another limitation is related to the sample. Respondents come from many countries, and while we control for international differences by grouping them together in country clusters, unaccounted for cultural differences may still be present in our data. Multilevel modeling can account for the nested structure of the data, which is relevant when researchers are interested in explaining any discrepancies between entrepreneurs from different countries. Furthermore, because effectuation is particularly relevant in environments in which uncertainty is high, it may be interesting to examine the link between country-specific characteristics, such as uncertainty avoidance, and the decision-making behavior of founders. In addition, the use of student samples in research is often criticized due to a purported lack of generalizability (Copeland, Francia, & Strawser, 1973; Robinson, Huefner, & Hunt, 1991). However, unlike other studies that focus on students with the intention of starting a business after they graduate (e.g., Krueger, Reilly, & Carsrud, 2000; Souitaris, Zerbinati, & Al-Laham, 2007; Zhao, Seibert, & Hills, 2005), we examine student entrepreneurs that are already active. Politis, Winborg, and Lindholm Dahlstrand (2011) have demonstrated that student entrepreneurs are comparable to expert entrepreneurs in terms of their reliance on effectual reasoning. Lastly, as addressed in the previous section, our sample does not account for discontinuation of ventures and survivor bias may be present. Therefore, our results apply to operational ventures only.

## **CONCLUSION**

With the present study, we aim to advance our understanding of how the interplay of effectuation and causation influences venture performance. Both logics have a claim to success in their own right. As the entrepreneurship literature frequently points out, the adoption of an effectual decision-making logic can be promising for firm founders. However, we caution

entrepreneurs and entrepreneurship scholars not to neglect the importance of a planning-oriented, causal approach. When combined with effectuation, causation is beneficial to venture performance. This relationship is driven by experimentation, i.e., the ability of an entrepreneur to create opportunities and shape an unpredictable future using the means at hand, while applying the logic of causation and employing traditional business planning activities concurrently. These insights contribute to the existing literature, but also reinforce the call for continued advancement in effectuation research.

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## TABLES

**Table 1**

Causal versus effectual reasoning.

	<b>Causal reasoning</b>	<b>Effectual reasoning</b>
<b>Starting point for reasoning/action</b>	<ul style="list-style-type: none"> <li>- Goal orientation: which means are needed to accomplish certain goals?</li> <li>- Clearly specified and given goals</li> </ul>	<ul style="list-style-type: none"> <li>- Means orientation: which goals can be achieved with the available resources?</li> <li>- Imagined and evolving goals</li> </ul>
<b>Risk predisposition</b>	<ul style="list-style-type: none"> <li>- Decision-making on the basis of financial forecasting</li> <li>- Calculating net present value</li> <li>- Maximizing expected returns</li> <li>- High upfront resource commitments</li> </ul>	<ul style="list-style-type: none"> <li>- Decision-making on the basis of what individuals are able and willing to risk (also non-financials)</li> <li>- Determining affordable loss</li> <li>- Limiting downside risk</li> <li>- Lean business operations</li> </ul>
<b>Attitude towards third parties</b>	<ul style="list-style-type: none"> <li>- Threat of competitors</li> <li>- Careful selection of alliance partners</li> <li>- Relationships are limited to what is considered necessary</li> <li>- Contractual trust: extensive contracting to restrict opportunistic behavior</li> </ul>	<ul style="list-style-type: none"> <li>- Parties can gain by working together</li> <li>- Actively looking for partners</li> <li>- Self-selected stakeholders</li> <li>- Commitment-based trust: partners benefit from making (small) credible commitments to a joint course of action</li> </ul>
<b>Environmental contingencies</b>	<ul style="list-style-type: none"> <li>- Contingencies are undesirable deviations from the plan</li> </ul>	<ul style="list-style-type: none"> <li>- Contingencies offer new opportunities</li> </ul>

Sources: Sarasvathy (2001, 2008); Sarasvathy & Venkataraman (2001); Read & Sarasvathy (2005); Sarasvathy & Dew (2008)

**Table 2**

Descriptive statistics and correlation matrix.

Variables and Scales	Mean	S.D.	1	2	3	3a	3b	3c	3d	4	5	6	7	8	9	10	11
1. Performance	4.28	1.49	(.88)														
2. Causation	4.28	1.65	.362**	(.90)													
3. Effectuation	4.66	1.07	.293**	.578**	(.88)												
3a. Experimentation	3.52	1.69	.245**	.551**	.661**	(.76)											
3b. Affordable Loss	5.03	1.69	.091**	.266**	.720**	.204**	(.87)										
3c. Pre-commitment	4.42	1.76	.304**	.482**	.683**	.383**	.274**	(.79)									
3d. Flexibility	5.36	1.14	.222**	.348**	.752**	.228**	.476**	.426**	(.76)								
4. Founder Age	30.59	9.12	.026	.007	.015	.017	-.011	.000	.031	-							
5. Gender <sup>a</sup>	0.31	0.46	.004	-.038	-.036	-.088**	.029	-.045*	.005	.039	-						
6. Commitment <sup>b</sup>	31.03	21.31	.249**	.262**	.138**	.187**	-.031	.170**	.097**	.176**	-.078**	-					
7. Self-employed Parents <sup>c</sup>	0.42	0.49	.090**	.093**	.061**	.056**	-.001	.072**	.060**	-.250**	.006	.039	-				
8. Work Experience <sup>d</sup>	3.88	7.02	.104**	.118**	.085**	.045	.031	.087**	.090**	.502**	-.022	.211**	-.087**	-			
9. Entrepreneurial Experience <sup>e</sup>	0.24	0.43	.103**	.121**	.063**	.153**	-.055*	.087**	.019	.106**	-.155**	.107**	.024	.065**	-		
10. Firm Age	5.28	5.81	.107**	.010	.039	.108**	-.041	.039	.007	.669**	-.049*	.164**	-.112**	.320**	.175**	-	
11. Firm Size <sup>f</sup>	2.92	7.75	.208**	.164**	.072**	.110**	-.044*	.131**	.043	.072**	-.039	.193**	.090**	.072**	.109**	.108**	-

Note: Reliability of the measure in parentheses (Cronbach's Alpha).

<sup>a</sup> 0=male, 1=female;<sup>b</sup> average hours worked/week;<sup>c</sup> 0=no, 1=at least one;<sup>d</sup> total years of relevant work experience (assuming 50 weeks with 40hours/week per year);<sup>e</sup> 0=no, 1=yes;<sup>f</sup> current number of FTE;

\* p&lt;.05;

\*\* p&lt;.01.

**Table 3**

Results of hierarchical regression analyses.

	Venture Performance									
	Model I		Model II		Model III		Model IV		Model V	
	Std. coeff.	<i>t</i> -value	Std. coeff.	<i>t</i> -value	Std. coeff.	<i>t</i> -value	Std. coeff.	<i>t</i> -value	Std. coeff.	<i>t</i> -value
Causation			.226***	7.095	.235***	7.393	.209***	6.463	.237***	7.135
Effectuation			.123***	4.102	.117***	3.898				
Experimentation							.029	1.005	.000	.015
Affordable Loss							-.060*	-2.149	-.062*	-2.218
Pre-commitment							.125***	4.267	.124***	4.227
Flexibility							.103***	3.516	.094**	3.131
Founder Age	-.162***	-4.128	-.118**	-3.152	-.109***	-2.911	-.105***	-2.833	-.098**	-2.637
Gender	.041	1.615	.039	1.606	.033	1.346	.041*	1.676	.033	1.358
Commitment	.130***	4.794	.088***	3.391	.088***	3.393	.086***	3.334	.075**	2.884
Self-employed Parents	.034	1.280	.018	.712	.024	.963	.020	.786	.023	.928
Work Experience	.093**	3.178	.058*	2.063	.057*	2.040	.054**	1.957	.053	1.910
Entrepreneurial Experience	.063*	2.453	.037	1.484	.040	1.621	.032	1.313	.034	1.368
Firm Age	.147***	4.312	.156***	4.784	.149***	4.573	.161***	4.996	.148***	4.553
Firm Size	.144***	5.601	.120***	4.879	.119***	4.868	.106***	4.346	.105***	4.296
Causation x Effectuation					.086***	3.614				
Causation x Experimentation									.079**	2.752
Causation x Affordable Loss									.027	.945
Causation x Pre-commitment									.032	1.067
Causation x Flexibility									-.016	-.498
<i>Country Cluster Dummies &amp; Industry Dummies included</i>										
<i>R</i> <sup>2</sup>	.136		.217		.224		.231		.241	
<i>F</i>	10.712***		17.243***		17.208***		16.492***		15.051***	
<i>N</i>	1453		1453		1453		1453		1453	

Note: IVs are mean-centered

\*\*\* significant at the 0.001-level ( $p < .001$ ) / \*\* significant at the 0.01-level ( $p < .01$ ) / \* significant at the 0.05-level ( $p < .05$ )

**Table 4**

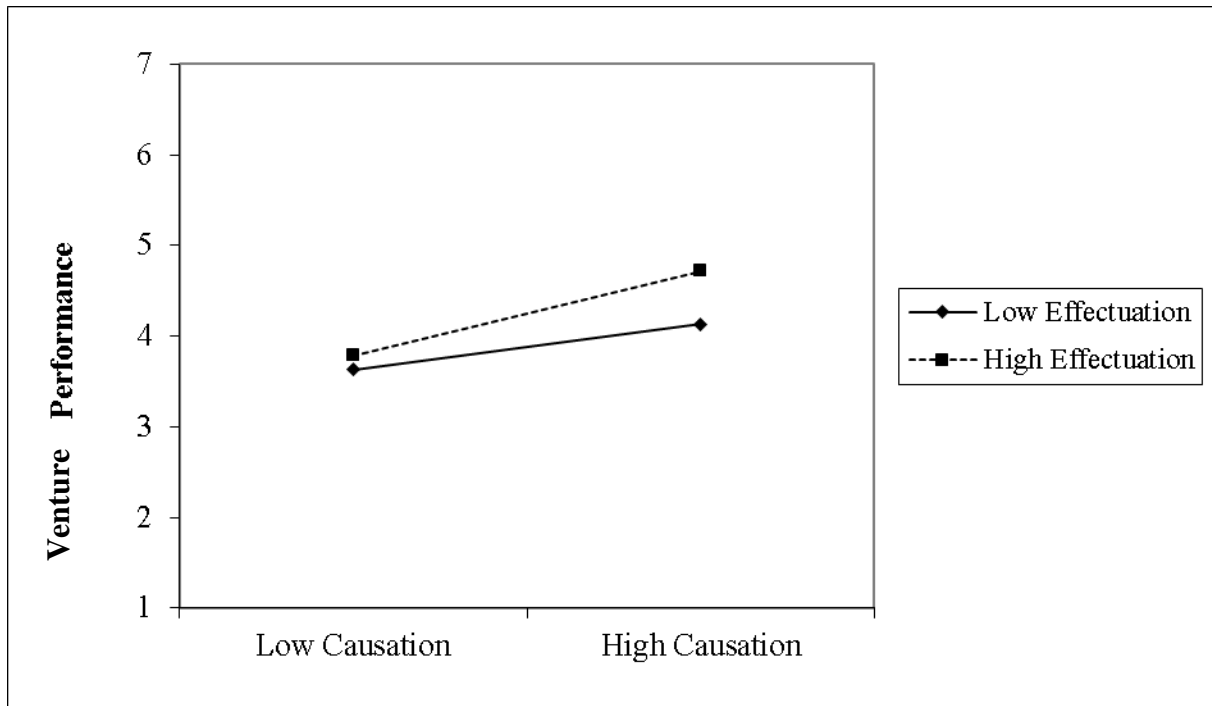
Summary of results.

<b>Hypothesis</b>	<b>Proposed relationship</b>	<b>Degree of support</b>
1	An entrepreneur's use of causal reasoning is positively related to venture performance.	Fully confirmed.
2	An entrepreneur's use of effectual reasoning is positively related to venture performance.	Fully confirmed.
3	An entrepreneur's joint use of causal and effectual reasoning will have a positive effect on venture performance.	Fully confirmed; however, for the separate principles, only causation in conjunction with experimentation has a positive effect on venture performance.

## FIGURES

**Figure 1**

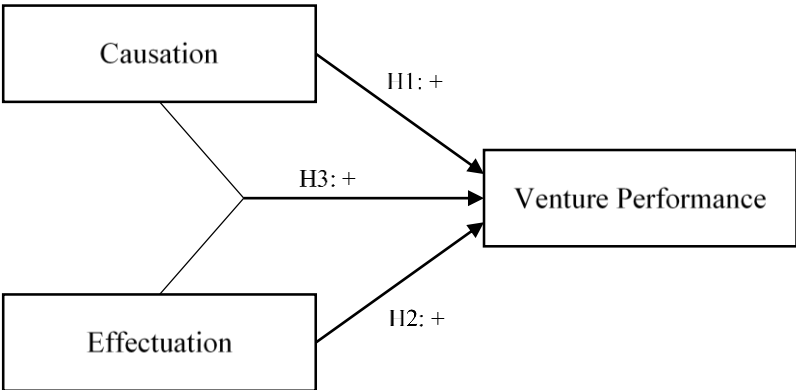
Interaction graph causation and effectuation.





**Figure 2**

Proposed direct and interactive effects of causation and effectuation on venture performance.



## APPENDIX

### Appendix 1

Overview of effectuation principles.

	As originally conceptualized (Sarasvathy, 2001):		As operationalized for validated scale (Chandler et al., 2011):	
<b>Overall premise</b>	Non-predictive control	<i>“Effectuation [...] focuses on the controllable aspects of an unpredictable future. The logic for using effectuation processes is: To the extent that we can control the future, we do not need to predict it.” (p.252)</i>	--- <sup>1</sup>	
<b>Starting point for reasoning/action</b>	Means-driven action	<i>“Only some means or tools are given; decision-making [...] help choose between possible effects that can be created with given means; given specific means, choice of effect is driven by characteristics of the actor and his or her ability to discover and use contingencies.” (p.251)</i>	Experimentation	<i>“a focus on short-term experiments to identify business opportunities in an unpredictable future” (p.377)</i>
<b>Risk predisposition</b>	Focus on affordable loss	<i>“Effectuation predetermines how much loss is affordable and focuses on experimenting with as many strategies as possible with the given limited means. The effectuator prefers options that create more options in the future over those that maximize returns in the present.” (p. 252)</i>	Affordable loss	<i>“a focus on projects where the loss in a worst-case scenario is affordable” (p.377)</i>
<b>Attitude towards third parties</b>	Focus on partnerships	<i>“Effectuation emphasizes strategic alliances and precommitments from stakeholders as a way to reduce and/or eliminate uncertainty and to erect entry barriers.” (p.252)</i>	Pre-commitments	<i>“an emphasis on pre-commitments and strategic alliances to control an unpredictable future” (p.377)</i>
<b>Environmental contingencies</b>	Leveraging contingencies	<i>“Effectuation [...] would be better for exploiting contingencies that arose unexpectedly over time.” (p.252)</i>	Flexibility	<i>“exploitation of environmental contingencies by remaining flexible” (p.377)</i>

<sup>1</sup> Not operationalized or included in research.

## Appendix 2

Factor analysis results.

	Factor				
	1 Causation	2 Affordable Loss	3 Flexibility	4 Experimentation	5 Pre-commitments
I analyzed long run opportunities and selected what I thought would provide the best returns.	.751				
I designed and planned business strategies.	.845				
I organized and implemented control processes to make sure we meet objectives.	.805				
I researched and selected target markets and did meaningful competitive analysis.	.820				
I designed and planned production and marketing efforts.	.790				
I experimented with different products and/or business models.				.626	
The product/service that I now provide is substantially different than I first imagined.				.825	
I tried a number of different approaches until I found a business model that worked.				.816	
I was careful not to commit more resources than I could afford to lose.		.843			
I was careful not to risk more money than I was willing to lose with my initial idea.		.902			
I was careful not to risk so much money that the company would be in real trouble financially if things did not work out.		.826			
I allowed the business to evolve as opportunities emerged.			.788		
I adapted what I was doing to the resources we had.			.700		
I was flexible and took advantage of opportunities as they arose.			.819		
I avoided courses of action that restricted our flexibility and adaptability.			.509		
I used a substantial number of agreements with customers, suppliers and other organizations and people to reduce the amount of uncertainty.					.792
I used pre-commitments from customers and suppliers as often as possible.					.848

Note: Principal Component Analysis, Varimax Rotation with Kaiser Normalization and 5 Factors

### Appendix 3

Causation and effectuation scale (adapted from Chandler et al., 2011).

<p><b>Causation</b></p>	<p>I analysed long run opportunities and selected what I thought would provide the best returns.</p> <p>I designed and planned business strategies.</p> <p>I organized and implemented control processes to make sure we meet objectives.</p> <p>I researched and selected target markets and did meaningful competitive analysis.</p> <p>I designed and planned production and marketing efforts.</p>
<p><b>Effectuation: Experimentation<sup>1</sup></b></p>	<p>I experimented with different products and/or business models.</p> <p>The product/service that I now provide is substantially different than I first imagined.</p> <p>I tried a number of different approaches until I found a business model that worked.</p>
<p><b>Effectuation: Affordable Loss</b></p>	<p>I was careful not to commit more resources than I could afford to lose.</p> <p>I was careful not to risk more money than I was willing to lose with my initial idea.</p> <p>I was careful not to risk so much money that the company would be in real trouble financially if things did not work out.</p>
<p><b>Effectuation: Pre-commitment</b></p>	<p>I used a substantial number of agreements with customers, suppliers and other organizations and people to reduce the amount of uncertainty.</p> <p>I used pre-commitments from customers and suppliers as often as possible</p>
<p><b>Effectuation: Flexibility</b></p>	<p>I allowed the business to evolve as opportunities emerged.</p> <p>I adapted what I was doing to the resources we had.</p> <p>I was flexible and took advantage of opportunities as they arose.</p> <p>I avoided courses of action that restricted our flexibility and adaptability.</p>

<sup>1</sup> Item deleted: The product/service that I now provide is essentially the same as originally conceptualized.