The influence of an industry's capital-intensity on the decision-making of entrepreneurs with regards to effectuation and causation: an empirical analysis

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ABSTRACT

The concept of effectual and causal thinking in entrepreneurial decision-making has been an emerging field for theoretical and empirical considerations in the past 15 years. Since the original introduction by Sarasvathy (2001), literature has proven that different approaches of decision-making have been observed in different people, depending on both external (environmental) and internal (cognitive) influences. In this analysis, a distinct focus is set on the influence of financial risk in entrepreneurial decisions, whether entrepreneurs follow one specific decision-making logic when particularly exposed to questions regarding risk.

This paper takes the idea that environmental factors affect an entrepreneur's notion in decision-making and analyzes the particular influence of the industry in which the venture operates. Industries are distinguished by the capital that is required in order to enter them and to start with operational activities. The analysis is conducted with a sample of 69 German entrepreneurs than founded their companies not longer than five years ago. Within both capital-intensive and less capital-intensive industries, a clear propensity towards one specific decision-making approach could be identified; yet, the same approach for both industry types. A univocal tendency towards one logic within an industry type would lead to the assumption that the industry is influential, however, none of the examined industry types shows a considerably stronger tendency towards causation than the other. Therefore, the industry of a venture cannot be identified as the driving influence in decision-making processes. It is expected that other factors have an influence on the decision-making logic of an entrepreneur as well.

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1. INTRODUCTION

Nowadays, many people decide to start their own business (Wennekers & Thurik, 1999). Prior to starting an own company, a potential entrepreneur needs to consider different aspects before eventually bringing his project or idea into existence. Apart from a more general analysis of whether the idea itself would work, potential entrepreneurs should ask themselves whether their idea can be successful in a commercial setting. They need to have a clear understanding of how the industry functions in order to cope with unforeseen changes, most importantly in highly innovative areas (Rothwell & Zegveld, 1982) and when high capital investments are involved (Sudek, 2006).

Particularly young people chose for self-employment and pursuing their own idea rather than taking a classic career path in an established company (Kelley et al., 2012). Their analysis and reasoning when starting a business can, however, miss some important details due yet missing life experience (*European Youth Forum Position Paper on Youth Entrepreneurship*, 2011). Especially for young university graduates, a clear overview and knowledge of the industry can be key to success. Higher and advanced education can additionally facilitate entrepreneurial activities of young people; they acquire skills in their studies which enhance their ability to create their own businesses (Casson, 1995; Shane & Venkataraman, 2000). This is not merely restricted to one field of knowledge; entrepreneurship is a phenomenon that can be seen throughout all disciplines (Thomas & Mueller, 2000), leading to a diversity of young companies creating innovative products and solutions in their respective area of expertise.

For many of the young and first-time entrepreneurs, the financial abilities of their venture are important to be discussed at an early stage. Starting a business without cash at hand is almost impossible, whether an entrepreneur intents to develop a new product, needs equipment to offer a service or requires securities for licenses or insurances of his undertaking. Capital can come from different sources (i.a. venture capital or angel investments) but most commonly an entrepreneur invests his own assets as far as he can (Liilfesmann, 2000). Not all activities require the same amount of capital in order to start operations; it heavily depends on the environment and the requirements of the setting in which the entrepreneur pursues his business.

Entrepreneurial actions throughout all industries are based on reasoning that can follow miscellaneous logics. Logics of decision making, in the context of entrepreneurial activities, were conceptualized by Sarasvathy (2001) with regards to effectuation and causation as strategic means. She distinguishes two different strategic approaches for decision-making. One is based on the preservation of strategic flexibility, a non-predictive strategic approach (Wiltbank et al., 2006); decisions are made considering its direct effect rather than long-term planning due to a rather uncertain environment (Brettel et al., 2012). The other one is grounded on a more planned basis, following a pre-set strategy (Sarasvathy, 2001), having specific goals set as the driver for decisions. Whether an entrepreneur follows the one or the other is not necessarily a conscious decision he or she just makes, it is more an intuitive course of action driven by different factors, one of those possibly being the industrial environment of the entrepreneur.

Different factors have been studied that are considered to influence an entrepreneur with respect to effectuation or causation. A prediction when and under which circumstances a decision should be based on one or the other logic is yet unclear (Johansson & McKelvie, 2012). Uncertainty (Harmeling, 2007; Read et al., 2009; Wiltbank et al., 2006), entrepreneurial expertise (Baron, 2009; Dew, Read, et al., 2009; Read & Sarasvathy, 2005), and innovativeness (Brettel et al., 2012) are among the factors that have been previously investigated. However, many other factors contingently related to effectuation are not yet examined, even disregarded (Baron, 2009). One of these factors is the branch of industry; a clear tendency towards a specific approach of decision-making based on the industry of a young venture is yet to be identified. Since young enthusiastic entrepreneurs come from various fields of knowledge and have different backgrounds, the industrial environment presumably has an influence on the type of strategic approach he or she follows (Geroski, 1995).

The problem for many people intending to become entrepreneurs is the risk they face regarding the financial investments into their new venture. Founding a new bank or insurance company involves more money and bears more risk for the entrepreneur and his customers than for instance retailing beauty products online. The more entrepreneurs invest, the more they can potentially lose. It is important for them to pursue a sustainable business model that generates long-term profits as soon as possible. Regardless of the type of strategy that is chosen to lead to success, the mode of approaching this strategy is likely to be affected by the industrial environment of the company. This study analyzes whether an entrepreneur's meso environment has an influential impact on his decision-making towards effectuation or causation by answering the research question: ***To what extent does the type of industry have an effect on an either effectual or causal decision-making?***

Many industries have well-established incumbents that are operating for years in the industry, know the suppliers and difficulties associated with uncertainties. Novice entrepreneurs always face the uncertain likelihood of losing their invested capital when their company ceases to exist shortly after being established. The question that this paper will answer addresses this threat for novice entrepreneurs; it tries to give an indication to entrepreneurs which decision-making strategy they are advised to follow in different industries with different natures of required capital investments when entering the market.

2. THEORETICAL FRAMEWORK

The following paragraph elaborates on the concept of effectuation and causation from different viewpoints. The influential consideration of the sub-dimensions is outlined with a specific focus on the principle of affordable loss and expected returns. A theoretical connection between affordable loss and transaction costs is examined in the conceptualization of different industry types in paragraph 3.4. Lastly, a distinction between different industry branches is made which result in the assumption that a relationship between effectuation/causation and the type of industry exists. This relationship is presumably defined by the monetary involvement of an entrepreneur in his company prescribed by the requirements of the respective industry.

2.1 Effectuation and Causation: Impact of Financial Capital

2.1.1 Effectuation and Causation

Effectuation and causation are the two core concepts of one of the most acknowledged emerging theories in the observation of entrepreneurial actions (Fisher, 2012). This theory analyzes the means by which an entrepreneur makes decisions. Effectuation and causation as construct are grounded in a think aloud study

of entrepreneurs and their reasoning within the decision-making process by Sarasvathy et al. (1998). They describe to what extent an entrepreneur acknowledges or disregards resources, risks and other factors, such as stakeholders or opportunities he has at his disposal and can control in an environment of uncertainty and how that influences decision-making. It was first conceptualized by Sarasvathy (2001) as a cognitive process determining an entrepreneur's behavior; effectual and causal logic can be found in the daily as well as long-term decision-making of entrepreneurs.

Effectuation, as a non-predictive approach, is seen as having "a set of means […] given and [the] focus [lies] on selecting between possible effects that can be created with that set of means" (Sarasvathy, 2001, p. 245). In other words, rather the current situation and resources are taken as guidance/basis for decisions regarding the future instead of precisely defining the final outcome. Effectuation is the thinking framework that is commonly favored by expert entrepreneurs. Contrarily, within causation, a certain effect, an end, a goal or a desired state is given and the focus is "on selecting between means [and resources] to create that effect" (Sarasvathy, 2001, p. 245). Causation presumes that the entrepreneur identifies a goal beforehand; he follows a more predictive logic based on planned behavior. The chef and meal analogy (Sarasvathy, 2001) depicts a good example for this: effectuation can be described as a chef intending to cooking a meal; he looks into his kitchen to see which ingredients he has available and with those he starts cooking a meal. Causation, on the other hand, is described by the situation that the chef receives an order or has the intention to cook a specific meal and then acquires the ingredients that he needs in order to cook the meal.

Effectuation and causation are not considered mutually exclusive but rather that they are different approaches used at different times in different situations, not regarding one better than the other one (Perry et al., 2012; Sarasvathy, 2008). The interaction of both is common since not all actions can be planned in advance and opportunities often arise along the way and are difficult to predict in advance.

Contingencies make situations uncertain and not always allow for a clear prediction of an outcome. They require entrepreneurs to steadily reconsider their situation as well as their actions (Dew, Read, et al., 2009). Being open for uncertain contingencies allows for embracing arising opportunities that have not been previously considered. Effectuation is regarded as most appropriate for entrepreneurs particularly exposed to uncertainties due to i.a. not yet existing markets (Fisher, 2012).

2.1.1.1 Theoretical Assessment

Arend et al. (2015) were among the first to make an assessment of the theoretical developments and assumptions made about effectuation in the past years. They analyzed to what extent the developed theoretical assumptions explain the different phenomena in entrepreneurship with special attention to the consideration of effectuation as a theory. The conclusion suggests that a further development of the theoretical discourse in five specific directions would increase effectuation's scope and theoretical acknowledgment. Two of these are particularly important in relation to sustainable monetary concerns of entrepreneurial activities in the view of effectuation. The consideration of investments is said to be "oversimplified" (Arend et al., 2015, p. 641); effectuation solely concentrates on possible loss rather than diversely considering different options. In order to sustainably achieving success, new ventures have to be competitive in their industries offering competitive products rather than persuade with sound strategic considerations. Arguably, this is not heeded by effectuation theory and further in-depth research regarding the entrepreneurial circumstances and the behavioral component of effectuation is advised.

There have been discussions about the critical assessment and the opinion of Arend et al. (2015) letting Read et al. (2016) to comment on the article claiming that effectuation is an underdeveloped theory and lacking essential criteria for scientific theories. They point out that Arend et al. (2015) disregard major parts of the evolved literature and that their approach to theory testing (seeing the world as stable, only having human actions occurring within) does not complement and comprehend the structure of effectuation as a concept that is based on a continuously changing environment.

Additionally, other scholars made contributions towards research of effectuation as a theory (Perry et al., 2012) a; Brettel et al., 2012; Chandler et al., 2011; Chandler et al., 2007). Perry et al. (2012) suggest to further empirically study effectuation in order to mitigate the influence of unidentified control variables. Specific focus shall be on the environmental influence on entrepreneurs leading to different perceptions of uncertainty that are likely related to differently applying effectual or causal logic. Similarly to Arend et al. (2015), Perry et al. (2012) imply that measures, constructs, and relationships of constructs are to be further distinctly developed. Overall, effectuation and causation are going towards "an intermediate level of research" (Perry et al., 2012, p. 840), leaving the chance for yet to come research to amplify and test assumptions and observations.

2.1.2 Sub-Dimensions

Bearing in mind the aforementioned discussion on the conceptualization of effectuation and causation, there have been several approaches to defining sub-constructs clearly identifying both logics (Brettel et al., 2012; Chandler et al., 2011; Fisher, 2012). In principle, they all base on the originally defined sub-dimensions by Sarasvathy (2001). Those allow scholars to identify certain behaviors and to allocate them to either effectuation or causation. The basis for these dimensions lies in a study of cognitive processes, of people who were being confronted with a problem, that Sarasvathy and her colleagues realized in 1998. Sarasvathy et al. (1998) found behaviors were later (2001) related to different sub-constructs, the first one describing effectual behavior and the second one causal behavior. Entrepreneurs in a the development of strategic decisions are "(1) [starting] with a given goal or a set of given means; (2) focusing on expected returns or affordable loss; (3) emphasizing competitive analysis or strategic alliances and pre-commitments; (4) exploiting preexisting knowledge or leveraging environmental contingencies; and (5) trying to predict a risky future or seeking to control an unpredictable future" (Perry et al., 2012, p. 839). Each of the sub-dimensions features an effectual and a causal counterpart. Many entrepreneurs follow a hybrid approach in practice, by making use of different sub-constructs from both effectuation and causation rather than strictly following one approach solely (Chandler et al., 2011; Harms & Schiele, 2012; Sarasvathy, 2001).

2.1.2.1 Affordable Loss – Expected Returns

The aspect of risk in entrepreneurial decision-making is described by the effectual and causal sub-constructs "affordable loss" and "expected returns" respectively. The construct risk is the one being most closely related to financially driven decisions in the theory of effectuation and causation (Sarasvathy, 2001) and therefore explicitly stressed in this

research. The two sub-dimensions accurately express the contrast between the two approaches. One has a non-predictive, risky character; it exposes and weighs the risks and possible downsides of an entrepreneurial action; it evaluates what an entrepreneur can possibly lose when the action fails to succeed (Read & Sarasvathy, 2005). The other one, the causal counterpart stresses the determination of expected returns of the particular action. An entrepreneur rather examines the profit he can potentially gain.

Affordable loss as a component of effectuation elaborates on what the entrepreneur can afford and is willing to lose in order to start or run his business. Losing the invested means is tolerated in this approach. It determines the risk an entrepreneur can bear, expressed i.a. in the maximum height of investments that he can personally make into his company but accepts to lose in case of failure. The invested means shall not exceed the point where a total loss of it is not survivable.

Decisions made based on the principle of affordable loss or acceptable risk are mostly situated in an environment of uncertainty (Dew, Sarasathy, et al., 2009) and follow a non-predictive manner. In circumstances of uncertainty, special attention to negative possibilities is essential to cope with the unpredictable consequences and the overall risk at hand. Keeping in mind that in case of failure the invested money becomes irrecoverable, assessing analysis about the height seems inevitable.

For entrepreneurs that make decisions based on the assessment of what they might lose, perceive the possible downsides of their venture as more salient (Dew, Sarasathy, et al., 2009). This might be due to the exogenous influences and factors indicating costs that the entrepreneur itself cannot control. An effectual person uses the means given to him, assesses the factors that are primarily surrounding him and then decides from there how to proceed. This is nothing different in the case of decision-making a situation with unsteady conditions; he evaluates the given uncontrollable ascendancies and concludes what he can bear to risk.

Contrarily, in causal thinking, the expected returns play a more prominent role since an entrepreneur immediately considers the yield of financial gains of a pre-determined strategic set of goals. It has been investigated that an individual entrepreneur that has more capital involved (risk) in his business is more likely to follow a causal strategic approach (Sarasvathy, 2001). He sets goals for himself and the company on the basis of which he then calculates the return he can expect. This different view clarifies the diverging views on how to approach the plunge into entrepreneurship from a financial point of view.

An entrepreneur does not only decide for himself what he can afford to lose, there are other factors, next to him, that additionally have an influence on his means or the monetary amount. One of the key factors is the capital that is generally required to do business in the industrial environment his company pursues to establish in.

2.2 Industry Branches

All industries and environments are systematically different (Bain, 1956). There have been a number of endeavors in the past to precisely distinguish between industries and to allocate entrepreneurial activities to specific industries. Today, several industry classification systems are used in literature and economics (Bhojraj et al., 2003). The Global Industry Classification Standard (GICS) is the one most commonly used. It was developed to compensate the drawbacks of the antiquated SIC classification, for which the basis was introduced in the 1930's. Consequently, it disregards all of the technology-driven industries that were not yet existing then (Kile & Phillips, 2009). The GICS is the most empirically solid classification system according to Hrazdil et al. (2013) and it is, therefore, a widely used method to sort companies by industries in academic research. Companies are allocated based on their primary activity and the revenue that derives from it.

The branch of industry in which a venture operates influences the way an entrepreneur does business, the way he allocates resources, the strategy he chooses and the way he makes decisions (Geroski, 1995; Hitt & Ireland, 1985). Every industry has different requirements that the entrepreneur needs to overcome. These impediments are commonly referred as entry barriers. Entry barriers can have very different origins and shapes. Among these are the degree of innovativeness, the overall level of uncertainty in the industry, the need for knowledge (e.g. patents (Cockburn & MacGarvie, 2011)), and capital investments (Lofstrom et al., 2014). The latter is highly regarded and studied in literature (Cetorelli & Strahan, 2006; D'Este et al., 2012; Mueller & Tilton, 1969; Wiltbank et al., 2009) and is particularly analyzed with a focus on different industries throughout this paper. It is a crucial factor for analyzing the character of an industry. The height of investments that are to be made in order to initiate the business defines the financial barriers ventures have to cope with before starting to do business.

2.2.1 Division of Capital Intensive and Non-Capital Intensive Industries

In addition to a general classification based on the entrepreneurial and operational activities, a dichotomous distinction of industries based on the capital that is required to initiate business transactions, allows for a focused analysis regarding entrepreneurs' financial involvement in their companies. Decision-making on the basis of these financial factors is utmost important for many companies; the required monetary liquidity is one of the key entry barriers for potential entrepreneurs (Lofstrom et al., 2014).

Overall, there are entrepreneurial activities in certain industries that require more capital than others. The amount entrepreneurs need to invest differs for each venture, always dependent on the environment in which the venture seeks its potential (Evans, 1967). A precise dichotomous allocation of industries by the means of their respective levels of financial intensity can be found in paragraph 3.4.

2.3 Hypotheses

One industry may require higher constraints to overcome in order to be entered than another one. Therefore, some entrepreneurs are more financially vulnerable to the context of their industry. They need to be more financially involved for a successful establishment of their venture in the market than others.

Literature suggests, when little uncertainty and more monetary involvements are characteristics of given circumstances, an entrepreneur is likely to follow a more causal decision-making (Sarasvathy, 2001). This is proven to be true for individual entrepreneurs (Wiltbank et al., 2009). This study intents to give empirically tested, statistical evidence whether this relationship is applicable to an entire industry. Hypothesis H1 states that *entrepreneurs that are active in industries with high capital requirements are more likely to follow a causal strategy.*

Contrarily to hypothesis H1, hypothesis H2 claims, the by literature suggested assumption (Sarasvathy, 2001), that entrepreneurs that have less risk involved and require less

monetary resources to establish their business have a tendency towards more effectual based thinking. They seem to have more freedom to experiment with the means at hand rather than having to justify every step towards investors or themselves since a no high monetary loss would be consequent to failure. Thus, hypothesizing this assumption indicates that *entrepreneurs that are active in industries with few capital requirements are more likely to follow an effectual strategy* (H2).

There has been research on the monetary influence on effectuation/causation before. However these scholars did not consider the impact of the industry in particular, rather focusing solely on the role of monetary investment and the strategic approach of individual entrepreneurs (Lofstrom et al., 2014) or projects (Brettel et al., 2012).

3. METHODOLOGY

3.1 Data Collection and Sample

The unit of analysis for this research is a homogeneous sample of 69 German entrepreneurs that hold an academic degree and founded their company since 2011. As German entrepreneurs are the focus of this analysis, the scales and additional information that the participants provided (entrepreneurial activities, branch of industry etc.) were translated into German language.

Publically accessible databases of German start up incubators and other consortiums of newly created ventures were used to find suitable entrepreneurs for this study. Approximately 2000 companies and entrepreneurs were contacted, first by sending emails to personal and company accounts and eventually by contacting the entrepreneurs directly through social media. It is to be noted that a rather formal contact by emailing more than 450 entrepreneurs led to an unsatisfying number of results. Intensive efforts to reach entrepreneurs personally through social media platforms afterwards increased the number of responses tremendously. In total, emails as well as social media contacts yielded to 130 responses, eventually resulting in 69 usable entries.

In order for responses to be counted as valid, entrepreneurs are to be German and hold at least a bachelor degree or an equivalent academic degree. They ought to be the founder of the venture and it must not be older than five years in order to analyze novice entrepreneurs in particular. These criteria were used to ensure that respondents form an internally comparable sample.

The mean age of the entrepreneurs is 31.6 years (SD = 7.51). 44.9% of the entrepreneurs obtained a master degree and 7.2% hold a PhD and the remaining 47.9% graduated with a bachelor diploma. For 72.5% of the responding entrepreneurs state that their current company is the first they have founded. The companies had on average 5 employees and existed for 1.8 (SD = 1.49) years at this point in time.

3.2 Survey: Measurement of Effectuation and Causation

The survey, that embodies the basis for this analysis, contains different scales previously developed by scholars testing different aspects: personal characteristics (Epstein et al., 1996), cultural habits (Gelfand et al., 2011), and the type of strategic approach someone follows in decision-making for his venture with respect to effectuation and causation (Alsos et al., 2014). This paper solely focuses on the scale measuring effectuation and causation (Alsos et al., 2014) and other control variables. The other mentioned scales in the survey were used for additional research projects related to this topic, focusing on other factors of entrepreneurial decision-making in detail.

Alsos et al. (2014) developed a scale for measuring effectuation and causation intending to achieve a better distinction between the two, to be individually measured with two different, yet related, scales. Effectuation and causation are not regarded as the opposite ends of one scale but rather two individual ones that are not mutually exclusive (Alsos et al., 2014; Kraaijenbrink et al., 2012). Previous scales have shown problems with i.a. a "lack of internal consistency indicated by low correlations between effectuation principles (Brettel et al., 2012; Chandler et al., 2011)" (Alsos et al., 2014, p. 4). Additionally, some of the previous scales considered effectuation and causation as mutually exclusive and polar opposites. Alsos et al. (2014) take a different approach by developing a new measurement scale that individually looks at both concepts.

The scale measures ten items, five items each for effectuation and causation. Effectuation and causation are measured by assigning scores to the five respective items by the use of a seven-point Likert scale ranging from "entirely disagree" (1) to "entirely agree" (7). All of the items are based on the sub-dimensions, one question targeting one sub-dimension (see Appendix 9.1**).** In general, the higher the score on an item is, the higher the respondent's tendency towards the respective approach for the particularly measured sub-dimension. Additionally, the mean of the items investigating causation and the mean for effectuation can be calculated in order to receive an overall implication of a favor towards one or the other strategic orientation. One score being higher than the other corresponding score describes a propensity towards the favored (higher scoring) approach or item. Statistical analysis can prove a significantly higher tendency to one or the other approach.

This study mainly focuses on the effects of affordable loss and expected returns. Hence, the items measuring affordable loss and expected returns are used next to the overall propensity (mean of all respective items) for analyzing the effect an industry has on an entrepreneur's decisions. Throughout the analysis, the mean score of all causal items as well as the mean of all effectual items are regarded in order to identify inconsistencies between the particular sub-construct analyzing risk and the overall decision-making logic.

3.2.1 Factor Analysis and Reliability

The exploratory factor analysis (EFA) provides evidence that the earlier translated scale (Alsos et al., 2014) still measures the same two factors as its English counterpart. The Kaiser-Meyer-Olkin measure for sampling adequacy (KMO = 0.76 > 0.7) and the Bartlett's test sphericity (Chi-square = 214.052, df = 45, $p < 0.000$) indicate that the data is appropriate for a factor analysis. The results propose 2 components (Eigenvalue > 1) that each measures one concept (5 items). All items individually load on one factor only (2 factors in total), telling that the items measure precisely the construct they are intended to measure. In total, 54.42% of all cases are explained by the two extracted components (Total variance explained = 54.42%).

Additionally, internal consistency of the scale is assured by using Cronbach's alpha to postulate a sound statistical analysis. Generally, a value > 0.70 is considered as acceptable for most academic purposes (Field, 2009). The Cronbach's alpha for the items measuring causation is 0.744 and therefore suggests a proper internal consistency. Cronbach's alpha for the effectual items is 0.808 and proposes relatively high internal consistency.

Both reliability analyses show a high internal consistency of the intended measurements.

3.3 Categorization of Industry Areas

The GICS classification system is applied in order to differentiate the different industries that are being analyzed. The GICS classification allocates companies to 10 sectors resulting in 24 different industry groups that are further split into another 67 industries (MSCI, 1999). The ten sectors offer a very broad disposition of industries that makes it difficult for most respondents of the survey to categorize themselves into. An increase in the time and effort people need to take to fill in the questionnaire increases the risk for survey fatigue and that they eventually do not complete the survey (Cook et al., 2000).

A decrease in the number of industry branches is useful to confine the analysis to a limited number of different values and to counteract additional time effort of respondents to search an entire database of industry branches to find the one that matches their activities best. In order to categorize the entrepreneur's activities into industries, the GICS classification offers a solid framework. The customized categorization that is used for the data collection survey resulted in eight different industry areas that can be clearly allocated to the ones proposed by the GICS classification. The selection of industry areas is based on the 24 GICS industry groups in relation to similarities of core activities within the industries. Heavy industrial and mining industries are disregarded in the categorization, because such industries require much time and high monetary investments (high minimum efficient size) (Fritsch et al., 2006), that there would not be any usable entries to expect. The identified industry areas, thus, are: *Service*, *Retail / E-Commerce*, *Energy / Utility /Logistics*, *Financials / Insurance / Real-Estate*, *Health / Fitness*, *IT / Hard- and Software*, *Engineering / Research,* and *Media / Entertainment / Creativity*. A precise relation of the eight evolved industry areas to the 24 industry groups can be found in Appendix 9.2.

The GICS based categorization into 8 industry areas identifies industries that feature different characteristics that make them unique in terms of their nature of knowledge background, their key activities and their need for capital when initiating a venture.

3.4 Dichotomous Segmentation of Industries using Transaction Costs

A dichotomous segmentation of industries is implemented in order to group and compare industries with high need for capital investment at the point of venture-establishment and those with less need for financial capital. The eight aforementioned industry areas are segmented into capital intensive and non-capital intensive industries based on the transaction costs associated with the respective industry.

Founders in each of those industries require capital in order to establish and grow their business (Cooper et al., 1994). However, some of industries require more capital than others, they are considered to be high capital intensive. To identify the capital requirements of a company for entering the market, the typical transaction costs in that industry are taken as an indicator. As those vary from industry to industry, it is a comparable indicator of how much capital is needed in the different industries to enter operational activities.

The essence of transaction costs is to display the costs associated with a business transaction in the open market (Coase, 1937). Next to primary costs, i.e. the costs of goods sold, they include secondary costs for negotiation and enforcement of the deals (Wang, 2003) plus costs of establishing the business and other nonmarket costs comprising time and costs for acquiring permits etc. (Wallis & North, 1986). Critical for disparities in transaction costs are those costs based on organizational choices (strategy), uncertainty in the environment and among others the frequency of transactions (Wang, 2003).

Transaction costs and the principle of affordable loss are similar in the nature of their conceptual perception of costs associated with business activities. Transaction costs are costs that somebody needs to spend in order to do business and the principle of affordable loss defines costs that somebody is willing to spend, bearing in mind the potential risk of losing it. Consequently, transaction costs determine the minimum that an entrepreneur needs to be able to lose in order to start his business. Especially in environments of high uncertainty, considering transaction costs are closely comparable with the costs entrepreneurs can afford to lose. Regardless of whether the entrepreneur personally is willing to invest more, he needs to invest at least the money that the transaction costs require him to invest. This number differs for each business (Nooteboom, 1993), but generally each industry exhibits a disposition whether transaction costs are rather high or low (Wallis & North, 1986).

Throughout the analyses, the terms regarding capital requirements or intensities are referred back to the following displayed allocation (Table 1) of industries based on transaction costs. The dichotomous classification of industries allows for a profound comparison of similar industries with few capital required and those industries with high capital intensity being necessary for successful realization of the business.

High Level of Transaction Costs (1)
Energy / Utility / Logistics (Hennart, 1988; Michaelowa & Jotzo, 2005)
Financials / Insurance / Real-Estate (Polski, 2000)
Engineering / Research (Landry & Amara, 1998)
Health / Fitness (Coles & Hesterly, 1998)
IT / Hard- and Software (Cockburn & MacGarvie, 2011)
Low Level of Transaction Costs (2)
Service (Brouthers & Brouthers, 2003)
Retail / E-Commerce (Bakos, 1998; Garicano & Kaplan, 2001)
Media / Entertainment / Creativity (Bathelt, 2002)

Table 1:
Industries sorted by their transaction costs

3.5 Division and Analyses of Sample

In order to separately analyze the influence of the different industries on effectual and causal decision-making, the sample is split into three units of analysis. One being the whole sample, the other two being capital intensive and less capital-intensive industries. Extracting the two different industry groups from the whole sample leads to 21.7% (n=15) of the companies being allocated to industries with high capital requirements, hence high transaction costs. Consequently, the majority of respondents (78.3%; n=54) is active in industries that are characterized by comparably low transaction costs. All three samples are tested for their normal distribution (Appendix 9.3).

3.5.1 Test of Normality (Whole Sample)

The Shapiro-Wilk test implies statistical significance that the empirical results of the items measuring causation does not show a normal distribution ($W_{(69)} = 0.96$; $p = 0.027$). However, the skewness of -0.717 (SE = 0.289) being > -2 and < 2 (George & Mallery, 2010) as well as the histogram suggest a normal distribution as such this is treated throughout the analyses. The Shapiro-Wilk test for the distribution of effectuation measuring items indicates normally distributed responses ($W_{(69)} = 0.975$; $p = 0.171$). The skewness (0.107; SE = 0.289) supports this assumption. Thus, responses for both scales are normally distributed and can be treated as such in the analyses.

Furthermore, the distribution of both 2nd sub-constructs of effectuation and causation, affordable loss and expected returns respectively is tested in order to assume normality of the sample. Even though the distribution for both sub-dimensions is presumably not normal according to the Shapiro-Wilk test ($W_{\text{Aff. Loss}(69)} = 0.943$; $p_{\text{Aff. Loss}} = 0.003$; $W_{\text{Exp. Returns}(69)} = 0.904$; $p_{\text{Exp. Returns}} = 0.000$), the skewness of both distributions ($\text{skewness}_{\text{Aff. Loss}} = -0.088$; $SE_{\text{Aff. Loss}} = 0.289$) ($\text{skewness}_{\text{Exp. Returns}} = -0.775$; $SE_{\text{Exp. Returns}} = 0.289$) as well as the histogram indicate a clear normal distribution.

3.5.2 Test of Normality (Highly Capital Intensive Industries)

According to the Shapiro-Wilk test for normality, the distribution for the means of overall effectual and causal decision making in highly capital intensive industries is normally distributed ($W_{\text{Effectuation}(15)} = 0.919$; $p = 0.189$; $W_{\text{Causation}(15)} = 0.905$; $p = 0.114$). The skewness of both approaches ($\text{skewness}_{\text{Effectuation}} = 0.225$; $SE_{\text{Effectuation}} = 0.580$) ($\text{skewness}_{\text{Causation}} = -1.243$; $SE_{\text{Causation}} = 0.580$), the histogram as well as the boxplot suggest likewise.

The distribution of the means of the 2nd sub-dimension of effectuation is normally distributed according to the Shapiro-Wilk test ($W_{\text{Aff. Loss}(15)} = 0.920$; $p_{\text{Aff. Loss}} = 0.191$). The distribution of expected returns as well shows a normal distribution according to the Shapiro-Wilk test ($W_{\text{Exp. Returns}(15)} = 0.887$; $p_{\text{Exp. Returns}} = 0.060$). The assumption of a normal distribution is additionally fulfilled when considering the skewness ($\text{skewness}_{\text{Aff. Loss}} = 0.346$; $SE_{\text{aff. loss}} = 0.580$) ($\text{skewness}_{\text{Exp. Returns}} = -1.002$; $SE_{\text{Exp. Returns}} = 0.580$) as well as histograms and boxplots of both sub-constructs.

3.5.3 Test of Normality (Less Capital Intensive Industries)

A normal distribution of causal and effectual decision making in industries with relatively low capital requirements is proven by the Shapiro-Wilk test ($W_{\text{Effectuation}(54)} = 0.975$; $p = 0.321$; $W_{\text{Causation}(54)} = 0.968$; $p = 0.156$). Accordingly, the skewness ($\text{skewness}_{\text{Effectuation}} = 0.078$; $SE_{\text{Effectuation}} = 0.325$) ($\text{skewness}_{\text{Causation}} = -0.533$; $SE_{\text{Causation}} = 0.325$), the histograms and the boxplots suggest a normal distribution.

The means of the 2nd sub-construct of effectuation are normally distributed. The Shapiro-Wilk ($W_{\text{Aff. Loss}(15)} = 0.943$; $p_{\text{Aff. Loss}} = 0.012$) ($W_{\text{Exp. Returns}(54)} = 0.897$; $p_{\text{Exp. Returns}} = 0.000$) test may suggest differently, whereas skewness ($\text{skewness}_{\text{Aff. Loss}} = -0.225$; $SE_{\text{Aff. Loss}} = 0.325$) ($\text{skewness}_{\text{Exp. Returns}} = -0.796$; $SE_{\text{Exp. Returns}} = 0.325$), the histograms and the boxplots clearly show a normally distributed sample. The boxplot for expected returns displays several outliers that most likely affect the significance of the Shapiro-Wilk test.

3.6 Statistical Analysis and Relevant Variables

The statistical analyses are conducted using SPSS. First of all, a factor analysis was employed in order to ensure that content validity of the scale, developed by Alsos et al. (2014), measuring effectuation and causation is retained after translation from English to German. In unfortunate instances bad language translation alters the meaning of the questions resulting in wrongly measured items. An exploratory factor analysis (EFA) ought to counteract this hazard and indicates the number of factors than can be extracted from the items. It revealed that and two factors were identified with all items loading on one factor only.

The dataset of all 69 valid responses is split between the industry groups for the analyses for an individual consideration of the industries and the decision-making approaches. In order to examine the relationship between the type of industry and effectual and causal logic, paired t-tests are used. Both overall effectual and causal decision-making as well as the sub-dimensions of risk (affordable loss/expected returns) are tested for significant differences in tendencies within both samples. Additionally, it is tested whether one industry type prefers a specific decision-making logic significantly more over the one. For that, a two-sample t-test for means is used.

3.6.1 Variables

The independent variable in this research is the "capital intensity of an industry" and the dependent variable the "strategic approach". The dichotomous independent variable features two values one being *low* the other one *high* (Lofstrom et al., 2014). It describes the level of capital requirements in the company's meso economic environment. The dependent variable indicates the strategic decision-making approach an entrepreneur follows. The corresponding values are *effectuation* and *causation* as a whole (all 5 items) as well as affordable loss and expected returns and their respective means.

In order to adequately test the relationship between the industries and the decision-making approach, the items of each approach measuring the affordable loss and expected returns respectively are additionally to effectuation and causation used for the paired t-test analysis. They investigate whether there is a significant difference of the tendency towards one approach over the other either of the two industry groups.

3.6.2 Control Variables

Next to the tested independent variable (the different industries), one or more other random independent variables might influence the propensity of an entrepreneur's decision-making logic. Therefore, the respondent's age and with it the influence of life experience, the educational degree, gender and the age of the company i.e. the experience in the field of entrepreneurship were investigated as control variables, using a two-way ANOVA analysis for both dependent variables. A two-way ANOVA is used to analyze the difference between the means (t-tests) of the independent factors and the one of the dependent variables (Field, 2009); it can give an implication of the interaction between the variables. The analysis was employed for both dependent variables individually as they represent a tendency to an approach rather than being the entire opposite. The outcome of this test solely investigates the relationship between the independent variables and the depend variables but not reciprocally among independent variables. It leads to the result that almost none of the variables have a statistically significant influence on the dependent variable except for one (Age: $p_{\text{Effectuation}} = 0.951$; $p_{\text{Causation}} = 0.755$; Education: $p_{\text{Effectuation}} = 0.628$; $p_{\text{Causation}} = 0.364$; Gender:

$p_{Effectuation}$ = 0.317; $p_{Causation}$ = 0.631; Company age: $p_{Effectuation}$ = 0.544; $p_{Causation}$ = 0.043). Only the age of the company shows a significantly different mean the overall score of causal decision-making. This can be an indicator for an influential relationship between the entrepreneurial experience and decision-making with regards to causation.

4. RESULTS

4.1 Effectuation and Causation

Item	Mean	Std. Deviation	t-test with α = 0.1
Effectuation	3.568	1.019	$t_{(68)} = 4.254$
Causation	4.556	1.326	p = 0.000*
Affordable loss	4.101	1.690	$t_{(68)} = 2.598$
Expected returns	4.884	1.451	p = 0.011*

Table 2: T-Test with Means of whole sample (n = 69)

The homogeneous sample presents a mean score of 3.568 (SD = 1.019) for effectuation and a significantly higher score for causation ($mean_{Causation}$ = 4.556; SD = 1.326; $t_{(68)}$ = 4.254; p < 0.000). The surveyed German entrepreneurs have a higher tendency to causal decision-making than they have for effectual logic when making entrepreneurial decisions. Equivalently, this counts for the mean scores of the second sub-constructs ($mean_{Aff.\ Loss}$ = 4.101; SD = 1.690; $mean_{Exp.\ Returns}$ = 4.884; SD = 1.451; $t_{(68)}$ = 2.598; p < 0.011). Respondents have a significantly higher tendency towards considering the expected returns rather than affordable loss. Overall, the sample displays a significant propensity towards causal decision-making.

Comparing the two different industry types next to each other, none of them shows a significantly higher tendency towards causation than the other one does ($t_{(67)}$ = -0.785; p = 0.435).

4.2 Testing Hypotheses

4.2.1 Hypothesis 1

Item	Mean	Std. Deviation	t-test with α = 0.1
Effectuation	3.560	1.382	$t_{(14)} = 1.510$
Causation	4.556	1.326	p = 0.153
Affordable loss	3.867	1.960	$t_{(14)} = 0.603$
Expected returns	4.333	1.448	p = 0.556

Table 3: T-Test with Means of capital-intensive industries (1) (n = 15)

Entrepreneurs that operate in industries characterized by high capital requirements do not seem to have a significantly higher tendency towards overall causal decision-making according to a paired sample t-test ($t_{(14)}$ = 1.510; $p_{(two\text{-}sided)}$ = 0.153) than they have to effectual decision-making. The pure means, however, do indicate a difference between causal and effectual decision-making as the mean score for causation is higher than for effectuation ($mean_{Effectuation}$ = 3.560; $SD_{Effectuation}$ = 1.382; $mean_{Causation.}$ = 4.556; $SD_{Causation}$ = 1.326).

Considering only the sub-dimension *expected returns*, a similar result can be found. The consideration of expected returns rather than affordable loss is not significantly higher ($t_{(14)}$ = 0.603; $p_{(two\text{-}sided)}$ = 0.556). Yet, the means show a certain difference in favor of expected returns ($mean_{Aff.\ Loss}$ = 3.867; $SD_{Aff.\ Loss}$ = 1.960; $mean_{Exp.\ Returns.}$ = 4.333; $SD_{Exp.\ Returns}$ = 1.448).

From a statistical point of view, this outcome rejects the hypothesis that there is no significantly higher tendency for the use of causal decision-making in highly capital-intensive industries.

4.2.2 Hypothesis 2

Item	Mean	Std. Deviation	t-test with α = 0.1
Effectuation	3.570	0.992	$t_{(53)} = 4.006$
Causation	4.607	1.323	p = 0.000*
Affordable loss	4.167	1.622	$t_{(53)} = 2.697$
Expected returns	5.037	1.427	p = 0.009*

Table 4: T-Test with Means of less capital-intensive industries (2) (n = 54)

Hypothesis 2 presumes that entrepreneurs that are active in industries with only few requirements for capital are more likely to make decisions based on effectual logic. Statistical analysis using a paired t-test shows that there is a significant difference in the use of effectuation and causation, however in favor of causal decision-making ($t_{(53)}$ = 4.006; $p_{(two\text{-}sided)}$ = 0.000). This result is clearly supported by considering the respective means ($mean_{Effectuation}$ = 3.570; $SD_{Effectuation}$ = 0.992; $mean_{Causation.}$ = 4.607; $SD_{Causation}$ = 1.323).

Similarly, regarding the factor risk within effectual and causal decision-making, the entrepreneurs in barely capital-intensive industries indicate a significant tendency towards causal logic and with it the notion of expected returns ($t_{(53)}$ = 2.697; $p_{(two\text{-}sided)}$ = 0.009). The different means of the 2nd sub-dimension suggest the same result ($mean_{Aff.\ Loss}$ = 4.167; $SD_{Aff.\ Loss}$ = 1.622; $mean_{Exp.\ Returns.}$ = 5.037; $SD_{Exp.\ Returns}$ = 1.427).

Hypothesis 2 is rejected even though a significant difference between the two approaches is identified. However, the observed difference is not corresponding with the hypothesized direction. In less capital-intensive industries decisions are seemingly made on the basis of causal logic instead of effectual logic.

5. DISCUSSION: EFFECT OF CAPITAL INTENSITY LEVELS IN DIFFERENT INDUSTRIES ON DECISION-MAKING

Literature shows when more risk is associated with entrepreneurial decision-making, they most likely make conclusions on the basis of causal logic. Naturally, risk is affiliated with monetary risk and its impact on the operations of the venture. The aim of this study is to give an indication whether the meso environment of a new venture and in particular the level of monetary involvement dominating in the industry can be a predictor for a decision-making approach. Literature proposes that the more risky situations are (hence capital intensive), the more decisions are made on a causal basis (Sarasvathy, 2001).

The outcome of this study rejects the assumption that the capital level of an industry is influential on the decision-making approach. Both hypotheses that back on the literature-based relationships of environmental impacts on causation and effectuation were not being able to prove their assumed direction of relationships. An additional comparison between the industries does not show any significant difference in the tendency towards causation. It lets to assume that the industry does not have a particular impact on the decision-making approach for the companies investigated by this study.

The first hypothesis is rejected due to no detected statistically significant difference between the means of causal and effectual tendencies. Nevertheless, the disparity in the means of effectuation and causation suggests an obvious difference in favor of causal logic. Hence, entrepreneurs in high capital requiring industries seem to favor causal decision-making over effectual; this solely might supports the hypothesis but does not explain a relationship between the industry and decision making without further analyzing other potential indicators. Reason for no statistical significance may be the relatively low sample size of n = 15, that was extracted for capital-intensive industries. Keeping that aspect in mind, a significant tendency towards causation could be likely nonetheless.

Investigations on whether entrepreneurs in less capital intensive industries make decisions based on effectual logic (H2) led to a statistically significant propensity towards causal reasoning; contrarily to the original conjecture. Arend et al. (2015) assume that only a few entrepreneurs are able to act based on effectual logic and the most follow a causal approach. Consequently, this results in more causal-thinking entrepreneurs; among other reasons, perhaps due to an overall causal behavior of people within the surveyed population.

There are influential factors that are not particularly considered in the analysis that are both related and unrelated to the industry. Business schools and education institutes commonly teach students to follow causal behavior when founding a business, first setting goals and determine possible outcomes (Johansson & McKelvie, 2012). Therefore, an overall causal propensity is not odd to be expected among entrepreneurs that recently founded their company (novice entrepreneurs). This sample thoroughly consists of academics and they seem to favor causal logics in general, whenever they are exposed to challenges such as establishing a business. Contrarily, entrepreneurs that did not immediately found a company after graduating university or are actively involved in businesses for a longer period of time rather follow effectual decision-making. They gain additional work and entrepreneurial experience on which they can rely on when making entrepreneurial decisions (Dew, Read, et al., 2009). Thus, many factors are interrelating with each other and conjointly form the characteristics of an entrepreneur and his propensity in logical reasoning.

One of these is the mentioned experience of an entrepreneur, both life and entrepreneurial experience. Dew, Read, et al. (2009) pointed out that novice entrepreneurs demonstrate a higher propensity towards decisions based on causal logic, whereas experienced entrepreneurs rely on effectual thinking. The results of this sample prove this observation to be true. 72.5% of the entrepreneurs among this sample indicate that they did not found a venture before and thus cannot rely on previous experience. Hence, novice entrepreneurs rather use the logics taught to them. Additionally, some entrepreneurs that faced failure with previous ventures subsequently designate this failure to the external environment (the industry) and start new projects within other fields. They, however, do not change their managerial approach; strategic considerations are based on the same logic as before (Eggers & Song, 2015). This observation visualizes that a clear distinction between novice and expert entrepreneurs has to be made in order to circumvent unintended bias by people that started in one industry but adapting their approach of decision-making to another. In general, the entrepreneurial expertise seems to be among the ascendancies that determine the active or subconscious choice for a strategic approach. This is one of the reasons why only young ventures (not older than five years) are investigated for the purpose of this study. This sample shows a general causal decision-making tendency that can be caused by their relatively short amount time being in business. A broader analysis with an extended data set, including expert entrepreneurs that are in business for more than five years, may reveal clarity about the role of expertise in the decision-making process.

Overall, the tendency in both industry groups is univocally identified towards causation. In all comparisons, the means suggest a clear favor towards causal decision-making despite one relationship not being significantly different (H1). Furthermore, a significant difference in decision-making between the two types of industries could not be identified, which leads to the result that an industry is not responsible for the choice of logical reasoning. It seems to have an influential character since an unambiguous propensity of decision-making is observed within the two different industry types. Additional influential factors surely exist, such as the entrepreneurial expertise that could have been identified to have significantly different results than the overall sample. The industry cannot be proved to be an exclusive influence of entrepreneurs favoring one specific logic.

A similar overall disposition can imply a bias by other individual factors. This indicates a non-generalizability of this result. It, however, provides a conclusive exposition of German novice entrepreneurs and their propensity towards causal decision-making logic in both types of industries.

5.1 Limitations

Miscellaneous aspects ought to be regarded when considering and assessing this study. First and foremost, the analysis solely concentrates on the impact of the entrepreneur's meso environment discounting on other factors that additionally determine the approach on strategic choices. Those factors as well as their interaction among each other and in relation to the industry are not analyzed in detail; yet, indications for those that are likely related to the industry and decision-making are mentioned.

Due to the limited data set and splitting the data, leading to relatively small sample sizes of, in one case only 15, might decrease statistical power of the analysis. Furthermore, the analysis solely focuses on German entrepreneurs, which can bias the outcome of tendencies, due to examining only one nationality.

For further research of industries and their impact, factors other than the financial entry barrier (transaction costs) may be analyzed to diversify the expressiveness of different industries and their impact on decision-making. In addition to not exclusively considering the financial influence related risk, an analysis consulting the other 4 sub-dimensions in relation with an associated entry barrier would allow for a more holistic picture of industry influence on effectuation and causation. Additionally, the number of companies in the different industry groups varied severely; therefore not all industries are equally represented in the analysis, potentially biasing the results. Considering the allocation of industry groups, it is to be noted that transaction cost can hardly be calculated precisely (Wang,

2003) and that transaction costs might as well differ significantly within one industry (Michaelowa & Jotzo, 2005).

6. CONCLUSION

The intention of this paper is to provide an answer to the question, whether and how the industrial environment of an entrepreneur influences his approach of decision-making. Analyses tested the assumption that the decision-making tendency of entrepreneurs is being influenced by their industrial environment. It was investigated that a relationship between both does not necessarily exist. However, there is a clear tendency towards one particular approach within an industry type; irrespective whether a decision specifically involves only risk or whether considering the overall decision-making logic (Appendix 9.10). The analysis of both industry types provides clear evidence for an industry-wide propensity towards causation; yet the preferred logic in both industries is the same. A similar approach popular in both industry types shows that other variables seemingly influence decision-making, particularly because they have completely different characteristics regarding their financial requirements. This would generally suggest the industries favoring different strategic thinking.

Considering the example of a newly founded bank and a start-up that retails beauty products online; clearly, there are differences in the way the founders make decisions; yet, this research suggests a similar logic of decision-making in both of them. Entrepreneurs in industries with high monetary requirements consider their actions from a causal perspective; this has been suggested by literature in the past. This study additionally shows that contrarily to literature assumptions, a causal use of strategic reasoning is found in less capital-intensive industries as well. It is proven that the decision-making logic does not necessarily depend on the level of investments required by an industry but that other factors may play a role as well. It is likely that due to a sample of mostly novice entrepreneurs and solely testing one nationality, a stronger propensity towards causation is found. Especially the factor of novice entrepreneurs has an evidently effect on decision making as experienced entrepreneurs favor a an effectual logic (Dew, Read, et al., 2009).

The overall tendency of the surveyed entrepreneurs towards causation has a biasing impact on the result. A reason for this overall causal propensity cannot be particularly associated to one specific factor that was tested. In general, the logic of reasoning of an entrepreneur is based on and influenced by a variety of factors, among which the type of industry can potentially be influential but not solely responsible for a univocal propensity.

6.1 Practical Relevance

The result of this study can mainly help novice entrepreneurs with yet missing experience to get an idea which specific decision-making logic is most prominent in their industry. Usually, the most commonly used approach is the one that has been proved to be reliable by many predecessors; otherwise a paradigm change would have been consequently over time. Yet, the industry is not an exclusive determinant and according to the findings being causal oriented and coming from novice entrepreneurs, potential entrepreneurs can rely on causation as likely to be not the wrong choice when starting a business.

7. ACADEMIC RELEVANCE AND FUTURE RESEARCH

7.1 Academic Relevance

This paper provides a challenging conclusion towards the previously analyzed relation of effectuation and causation with regards to the external circumstances of entrepreneurs. Literature suggests a common use of effectuation in an environment characterized by uncertainty (Brettel et al., 2012; Sarasvathy, 2001); this study suggests unlike the pre-assumed relationship, a causal tendency in uncertain, less financially impacted industries as well. As the theoretical development of effectuation and causation is yet to be profoundly characterized (Arend et al., 2015), an empirical study suggesting different results than previous studies can help to form a holistic picture of effectuation as a theory. Additionally, this study shows that other factors can potentially be a reason for a biased outcome.

7.2 Future Research

Although there is no significant difference between the two decision-making approaches among the industry types and a clear tendency towards causation, there might be a third factor that has influence on the way of entrepreneurial decision-making. The use of a solely German data set of novice entrepreneurs might influence the outcome into the one or the other direction. This aspect is a consideration for future studies about this topic. The results of this research can serve as a comparison for future studies about the same industries but in a different national setting to examine cultural influences.

Additionally, testing for control variables resulted in the identification of one significantly impacting influence: the age of the company. Future considerations may be investigating the relationship between the company's age and the way of the entrepreneur's decision-making. Following the results of this paper, it might be that the entrepreneurial expertise has an influencing character on decision-making.

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9. APPENDIX

	Goals orientation
	Expected Return
	Pre-existing knowledge
	Competitive analysis
	Prediction
	Means orientation
	Affordable loss
	Contingencies
	Pre-commitment
	Control

9.2 Allocation of Industry Areas Based on GICS Industry Classification

Industry Area	Related Group Codes
Service	253
Retail / E-Commerce	252, 256, 301, 302, 303
Energy / Utility /Logistics	101, 151, 201, 202, 203, 551
Financials / Insurance / Real-Estate	401, 402, 403, 404
Health / Fitness	351,
IT / Hard- and Software	451, 452, 453
Engineering / Research	251, 352
Media / Entertainment / Creativity	254, 501

GICS Industry Groups (24)

101	Energy
151	Materials
201	Capital Goods
202	Commercial & Professional Services
203	Transportation
251	Automobile & Components
252	Consumer Durables & Apparel
253	Consumer Services
254	Media
255	Retailing
301	Food & Staples Retailing
302	Food, Beverage & Tobacco
303	Household & Personal Products
351	Health Care Equipment & Services
352	Pharmaceuticals, Biotechnology & Life Sciences
401	Banks
402	Diversified Financials
403	Insurance
404	Real Estate
451	Software & Services
452	Technology Hardware & Equipment
453	Semiconductors & Semiconductor Equipment
501	Telecommunication Services
551	Utilities
901	Unspecified Industry Group

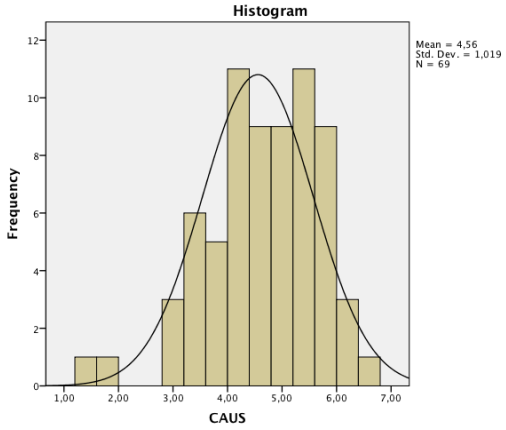
9.3 Test of Normality

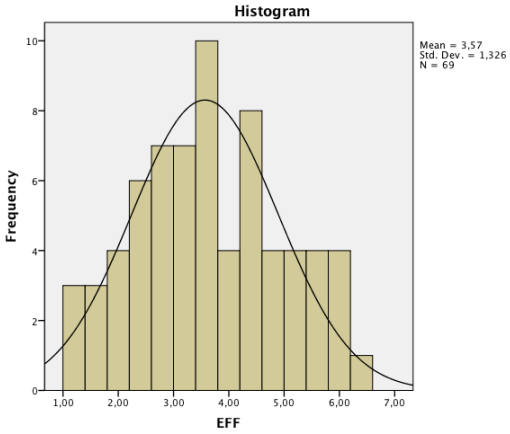
9.3.1 Whole Sample

1) Frequency distribution of means (Causation and Effectuation)

Descriptives

			Statistic	Std. Error
CAUS	Mean		4,5565	,12269
	95% Confidence Interval for Mean	Lower Bound	4,3117	
		Upper Bound	4,8013	
	5% Trimmed Mean		4,6061	
	Median		4,6000	
	Variance		1,039	
	Std. Deviation		1,01915	
	Minimum		1,40	
	Maximum		6,40	
	Range		5,00	
	Interquartile Range		1,40	
	Skewness		-,717	,289
	Kurtosis		,517	,570
EFF	Mean		3,5681	,15958
	95% Confidence Interval for Mean	Lower Bound	3,2497	
		Upper Bound	3,8866	
	5% Trimmed Mean		3,5646	
	Median		3,6000	
	Variance		1,757	
	Std. Deviation		1,32560	
	Minimum		1,20	
	Maximum		6,20	
	Range		5,00	
	Interquartile Range		1,90	
	Skewness		,107	,289
	Kurtosis		-,800	,570





Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CAUS	,103	69	,067	,960	69	,027
EFF	,070	69	,200*	,975	69	,171

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

2) Frequency distribution of 2nd construct: expected returns and affordable loss

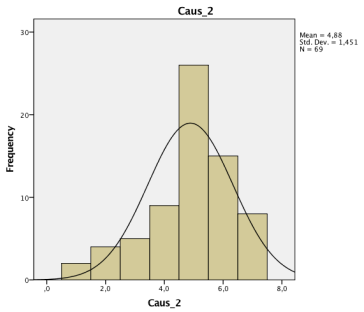
Descriptives

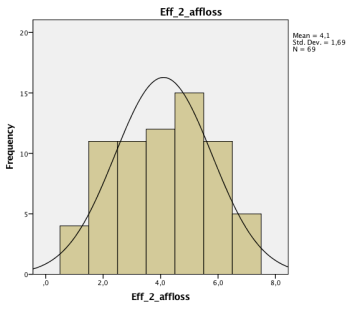
			Statistic	Std. Error
Caus_2	Mean		4,884	,1746
	95% Confidence Interval for Mean	Lower Bound	4,536	
		Upper Bound	5,233	
	5% Trimmed Mean		4,959	
	Median		5,000	
	Variance		2,104	
	Std. Deviation		1,4505	
	Minimum		1,0	
	Maximum		7,0	
	Range		6,0	
	Interquartile Range		2,0	
	Skewness		-,775	,289
	Kurtosis		,434	,570
Eff_2_affloss	Mean		4,101	,2035
	95% Confidence Interval for Mean	Lower Bound	3,695	
		Upper Bound	4,508	
	5% Trimmed Mean		4,113	
	Median		4,000	
	Variance		2,857	
	Std. Deviation		1,6903	
	Minimum		1,0	
	Maximum		7,0	
	Range		6,0	
	Interquartile Range		2,0	
	Skewness		-,088	,289
	Kurtosis		-,960	,570

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Caus_2	,242	69	,000	,904	69	,000
Eff_2_affloss	,152	69	,000	,943	69	,003

a. Lilliefors Significance Correction





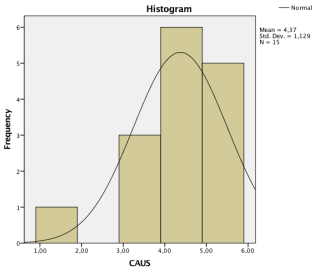
9.3.2 Split Sample

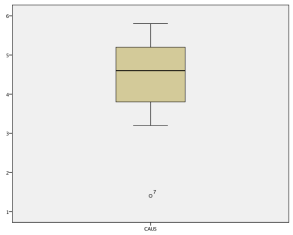
9.3.2.1 Highly capital intensive industries

1) Effectuation and Causation

Descriptives

			Statistic	Std. Error
CAUS	Mean		4,3733	,29138
	95% Confidence Interval for Mean	Lower Bound	3,7484	
		Upper Bound	4,9983	
	5% Trimmed Mean		4,4593	
	Median		4,6000	
	Variance		1,274	
	Std. Deviation		1,12851	
	Minimum		1,40	
	Maximum		5,80	
	Range		4,40	
	Interquartile Range		1,80	
	Skewness		-1,243	,580
	Kurtosis		2,301	1,121
EFF	Mean		3,5600	,35681
	95% Confidence Interval for Mean	Lower Bound	2,7947	
		Upper Bound	4,3253	
	5% Trimmed Mean		3,5556	
	Median		3,6000	
	Variance		1,910	
	Std. Deviation		1,38192	
	Minimum		1,60	
	Maximum		5,60	
	Range		4,00	
	Interquartile Range		2,80	
	Skewness		,225	,580
	Kurtosis		-1,344	1,121



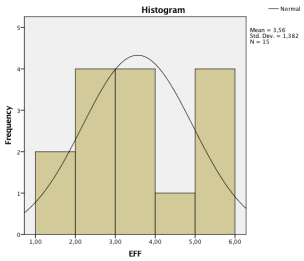


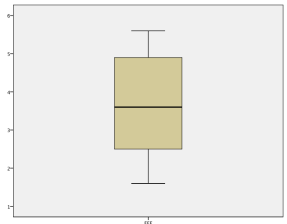
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CAUS	,180	15	,200*	,905	15	,114
EFF	,155	15	,200*	,919	15	,189

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

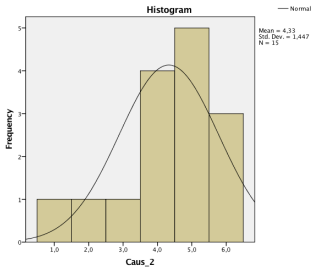


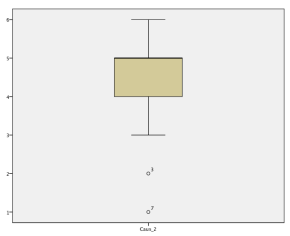


2) 2nd Construct

Descriptives

			Statistic	Std. Error
Caus_2	Mean		4,333	,3737
	95% Confidence Interval for Mean	Lower Bound	3,532	
		Upper Bound	5,135	
	5% Trimmed Mean		4,426	
	Median		5,000	
	Variance		2,095	
	Std. Deviation		1,4475	
	Minimum		1,0	
	Maximum		6,0	
	Range		5,0	
	Interquartile Range		1,0	
	Skewness		-1,002	,580
	Kurtosis		,748	1,121
Eff_2_affloss	Mean		3,867	,5058
	95% Confidence Interval for Mean	Lower Bound	2,782	
		Upper Bound	4,952	
	5% Trimmed Mean		3,852	
	Median		4,000	
	Variance		3,838	
	Std. Deviation		1,9591	
	Minimum		1,0	
	Maximum		7,0	
	Range		6,0	
	Interquartile Range		4,0	
	Skewness		,346	,580
	Kurtosis		-1,135	1,121



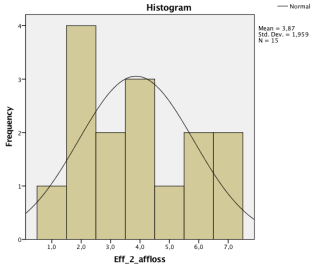


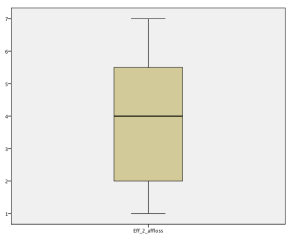
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Caus_2	,211	15	,072	,887	15	,060
Eff_2_affloss	,163	15	,200*	,920	15	,191

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction



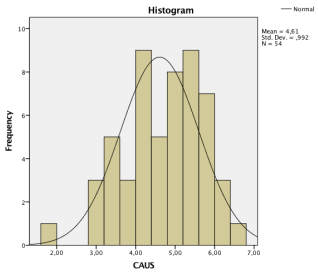


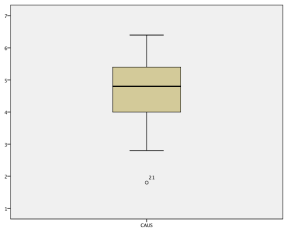
9.3.2.2 Less Capital Intensive Industries

1) Effectuation and Causation

Descriptives

			Statistic	Std. Error
CAUS	Mean		4,6074	,13500
	95% Confidence Interval for Mean	Lower Bound	4,3366	
		Upper Bound	4,8782	
	5% Trimmed Mean		4,6428	
	Median		4,8000	
	Variance		,984	
	Std. Deviation		,99202	
	Minimum		1,80	
	Maximum		6,40	
	Range		4,60	
	Interquartile Range		1,40	
	Skewness		-,533	,325
	Kurtosis		-,103	,639
EFF	Mean		3,5704	,18002
	95% Confidence Interval for Mean	Lower Bound	3,2093	
		Upper Bound	3,9315	
	5% Trimmed Mean		3,5658	
	Median		3,6000	
	Variance		1,750	
	Std. Deviation		1,32289	
	Minimum		1,20	
	Maximum		6,20	
	Range		5,00	
	Interquartile Range		1,80	
	Skewness		,078	,325
	Kurtosis		-,632	,639



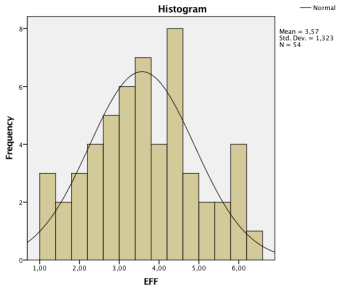


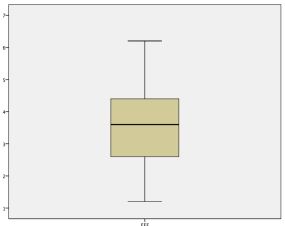
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CAUS	,117	54	,064	,968	54	,156
EFF	,065	54	,200*	,975	54	,321

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

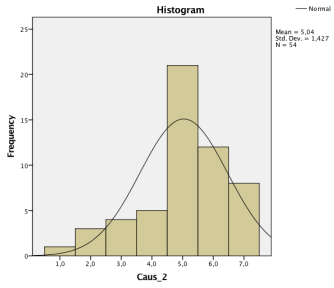


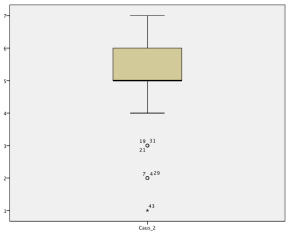


2) 2nd construct

Descriptives

			Statistic	Std. Error
Caus_2	Mean		5,037	,1942
	95% Confidence Interval for Mean	Lower Bound	4,648	
		Upper Bound	5,427	
	5% Trimmed Mean		5,117	
	Median		5,000	
	Variance		2,036	
	Std. Deviation		1,4270	
	Minimum		1,0	
	Maximum		7,0	
	Range		6,0	
	Interquartile Range		1,3	
	Skewness		-,796	,325
	Kurtosis		,515	,639
Eff_2_affloss	Mean		4,167	,2208
	95% Confidence Interval for Mean	Lower Bound	3,724	
		Upper Bound	4,609	
	5% Trimmed Mean		4,185	
	Median		4,000	
	Variance		2,632	
	Std. Deviation		1,6224	
	Minimum		1,0	
	Maximum		7,0	
	Range		6,0	
	Interquartile Range		2,0	
	Skewness		-,225	,325
	Kurtosis		-,816	,639

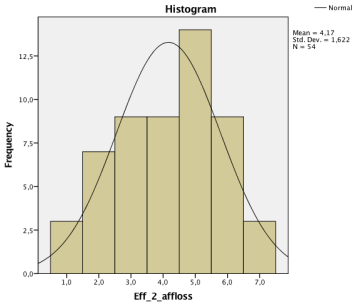


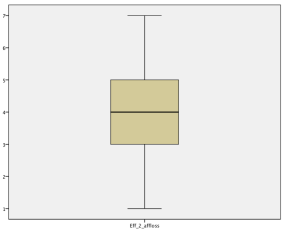


Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Caus_2	,249	54	,000	,897	54	,000
Eff_2_affloss	,178	54	,000	,943	54	,012

a. Lilliefors Significance Correction





9.4 Factor Analysis

Correlation Matrix[a]

		Caus_1	Caus_2	Caus_3	Caus_4	Caus_5	Eff_1	Eff_2_affloss	Eff_3	Eff_4	Eff_5
Correlation	Caus_1	1,000	,328	,401	,458	,279	-,269	-,162	-,264	-,291	-,318
	Caus_2	,328	1,000	,181	,409	,481	-,186	-,265	-,095	-,156	-,248
	Caus_3	,401	,181	1,000	,356	,202	-,037	,016	,020	,039	-,120
	Caus_4	,458	,409	,356	1,000	,567	-,170	-,150	-,237	-,117	-,301
	Caus_5	,279	,481	,202	,567	1,000	-,237	-,184	-,276	-,116	-,395
	Eff_1	-,269	-,186	-,037	-,170	-,237	1,000	,574	,391	,227	,404
	Eff_2_affloss	-,162	-,265	,016	-,150	-,184	,574	1,000	,496	,358	,487
	Eff_3	-,264	-,095	,020	-,237	-,276	,391	,496	1,000	,476	,616
	Eff_4	-,291	-,156	,039	-,117	-,116	,227	,358	,476	1,000	,558
	Eff_5	-,318	-,248	-,120	-,301	-,395	,404	,487	,616	,558	1,000
Sig. (1-tailed)	Caus_1		,003	,000	,000	,010	,013	,092	,014	,008	,004
	Caus_2	,003		,069	,000	,000	,063	,014	,219	,100	,020
	Caus_3	,000	,069		,001	,048	,382	,448	,435	,375	,164
	Caus_4	,000	,000	,001		,000	,082	,110	,025	,169	,006
	Caus_5	,010	,000	,048	,000		,025	,065	,011	,171	,000
	Eff_1	,013	,063	,382	,082	,025		,000	,000	,030	,000
	Eff_2_affloss	,092	,014	,448	,110	,065	,000		,000	,001	,000
	Eff_3	,014	,219	,435	,025	,011	,000	,000		,000	,000
	Eff_4	,008	,100	,375	,169	,171	,030	,001	,000		,000
	Eff_5	,004	,020	,164	,006	,000	,000	,000	,000	,000	

a. Determinant = ,035

KMO and Bartlett's Test

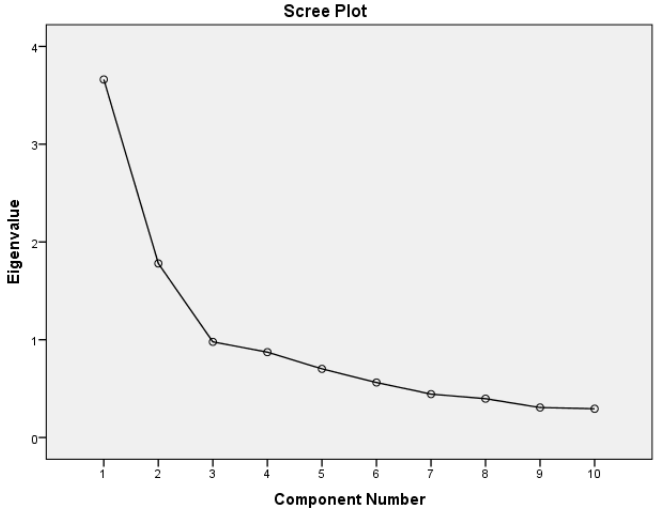
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,760
Bartlett's Test of Sphericity	Approx. Chi-Square	214,052
	df	45
	Sig.	,000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,662	36,617	36,617	3,662	36,617	36,617	2,928	29,276	29,276
2	1,780	17,803	54,420	1,780	17,803	54,420	2,514	25,144	54,420
3	,978	9,783	64,203						
4	,873	8,730	72,933						
5	,702	7,023	79,956						
6	,563	5,628	85,584						
7	,444	4,439	90,023						
8	,397	3,970	93,993						
9	,307	3,065	97,058						
10	,294	2,942	100,000						

Extraction Method: Principal Component Analysis.

Scree Plot



Rotated Component Matrix[a]

	Component	
	1	2
Caus_1		,653
Caus_2		,640
Caus_3		,653
Caus_4		,805
Caus_5		,696
Eff_1	,653	
Eff_2_affloss	,772	
Eff_3	,794	
Eff_4	,697	
Eff_5	,773	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	,781	-,625
2	,625	,781

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

9.5 Cronbach's Alpha – Reliability

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,744	,743	5

Cronbach's alpha for causation items

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,808	,809	5

Cronbach's alpha for effectuation items

9.6 Two-way ANOVA Analysis – Control Variables

Between-Subjects Factors

		Value Label	N
age_cat	1,00		35
	2,00		28
	3,00		5
	4,00		1
Sex	female	female	25
	male	male	44
Edu	1	Bachelor of Arts/Bachelor of Science (oder gleichwertig)	33
	2	Master of Arts/Master of Science, Diplom (oder gleichwertig)	31
	4	PhD/Dr.	5
Age_Cmpny	2011,0	5 years	4
	2012,0	4 years	10
	2013,0	3 years	6
	2014,0	2 years	15
	2015,0	1 years	22
	2016,0	0 years	12

Tests of Between-Subjects Effects

Dependent Variable: EFF

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	64,739[a]	36	1,798	1,051	,446
Intercept	325,808	1	325,808	190,424	,000
age_cat	,174	2	,087	,051	,951
Geschlecht	1,768	1	1,768	1,033	,317
EDU_New3	1,617	2	,809	,473	,628
WannwurdeIhrUnternehmengegründet	7,023	5	1,405	,821	,544
Error	54,751	32	1,711		
Total	997,960	69			
Corrected Total	119,490	68			

a. R Squared = ,542 (Adjusted R Squared = ,026)

Tests of Between-Subjects Effects

Dependent Variable: CAUS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	46,693[a]	36	1,297	1,734	,059
Intercept	614,821	1	614,821	821,931	,000
age_cat	,424	2	,212	,284	,755
Geschlecht	,175	1	,175	,235	,631
EDU_New3	1,559	2	,780	1,042	,364
WannwurdeIhrUnternehmengegründet	9,782	5	1,956	2,615	,043
Error	23,937	32	,748		
Total	1503,200	69			
Corrected Total	70,630	68			

a. R Squared = ,661 (Adjusted R Squared = ,280)

9.7 Distribution of Industries Divided by Capital-Intensity

Industry_Dich

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	15	21,7	21,7	21,7
	Low	54	78,3	78,3	100,0
	Total	69	100,0	100,0	

9.8 Paired Sample T-Test (Whole Sample)

9.8.1 Effectuation and Causation

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	CAUS	4,5565	69	1,01915	,12269
	EFF	3,5681	69	1,32560	,15958

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	CAUS & EFF	69	-,344	,004

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	CAUS - EFF	,98841	1,92991	,23233	,52479	1,45202	4,254	68	,000

9.8.2 2nd construct: Risk (affordable loss and expected returns)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Caus_2	4,884	69	1,4505	,1746
	Eff_2_affloss	4,101	69	1,6903	,2035

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Caus_2 & Eff_2_affloss	69	-,265	,028

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Caus_2 - Eff_2_affloss	,7826	2,5022	,3012	,1815	1,3837	2,598	68	,011

9.9 Paired T-Tests (Split Sample)

9.9.1 Highly capital intensive industries

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
High	Caus_2	4,333	15	1,4475	,3737
	Eff_2_affloss	3,867	15	1,9591	,5058
High	CAUS	4,3733	15	1,12851	,29138
	EFF	3,5600	15	1,38192	,35681

Paired Samples Correlations

		N	Correlation	Sig.
High	Caus_2 & Eff_2_affloss	15	-,537	,039
High	CAUS & EFF	15	-,374	,169

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
High	Caus_2 - Eff_2_affloss	,4667	2,9968	,7738	-1,1929	2,1263	,603	14	,556
High	CAUS - EFF	,81333	2,08596	,53859	-,34183	1,96850	1,510	14	,153

9.9.2 Less Capital Intensive Industries

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Low	Caus_2	5,037	54	1,4270	,1942
	Eff_2_affloss	4,167	54	1,6224	,2208
Low	CAUS	4,6074	54	,99202	,13500
	EFF	3,5704	54	1,32289	,18002

Paired Samples Correlations

		N	Correlation	Sig.
Low	Caus_2 & Eff_2_affloss	54	-,206	,134
Low	CAUS & EFF	54	-,337	,013

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Low	Caus_2 - Eff_2_affloss	,8704	2,3716	,3227	,2231	1,5177	2,697	53	,009
Low	CAUS - EFF	1,03704	1,90216	,25885	,51785	1,55623	4,006	53	,000

9.10 Comparison Between Overall Mean and Mean of 2nd Sub-Construct

9.10.1 Effectuation

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Eff_2_affloss	15	3,867	1,9591	,5058
EFF	15	3,5600	1,38192	,35681

One-Sample Test

	Test Value = 3.56					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Eff_2_affloss	,606	14	,554	,3067	-,778	1,392
EFF	,000	14	1,000	,00000	-,7653	,7653

9.10.2 Causation

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Caus_2	15	4,333	1,4475	,3737
CAUS	15	4,3733	1,12851	,29138

One-Sample Test

	Test Value = 4.37					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Caus_2	-,098	14	,923	-,0367	-,838	,765
CAUS	,011	14	,991	,00333	-,6216	,6283

9.11 Comparison: Causation Between Different Industry Types

T-Test

Group Statistics

	Industry_Dich	N	Mean	Std. Deviation	Std. Error Mean
CAUS	high	15	4,3733	1,12851	,29138
	low	54	4,6074	,99202	,13500

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
CAUS	Equal variances assumed	,010	,920	-,785	67	,435	-,23407	,29830	-,82948	,36133
	Equal variances not assumed			-,729	20,407	,474	-,23407	,32113	-,90309	,43494