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The impact of following a causation versus an effectuation approach on the survival of nascent entrepreneurial ventures in dynamic industries

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A research project submitted to the Gordon Institute of Business Science, University of Pretoria in partial fulfilment of the requirements for the degree of Master of Business Administration

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Abstract

This study determines the influence of causation versus effectuation on entrepreneurial firm survival in high and low dynamism industries.

Causation approaches a problem with the end in mind while effectuation's point of departure is the means. Causal logic predicts a best case future scenario and then gathers the necessary resources to realize that scenario. This is contrasted by effectual logic that attempts to "control" the future by making use of the resources in hand (and those that can be borrowed) while trying to achieve the best possible result.

The study consists of a means analysis testing for firm survival in highly dynamic industries per "pure" causal or effectual approach and of a variance analysis, testing for survival as a function of the mixed use of causation and effectuation in both high and low dynamism industries.

The product of the means analysis indicates that only two entrepreneurs out of a cohort of 1771 follow a "pure" causal or "pure" effectual approach. As a result of this finding the incidence of "pure" causal or effectual approaches in either high or low dynamism industries is negligible. The output from the variance analysis indicates that causation is a significantly better predictor of entrepreneurial survival than effectuation in both high and low dynamism industries at a 99% confidence level. Below is a summary of the survival probabilities for both high and low dynamism industries across the causal/effectual decision spectrum.

		Probability of Survival in High Dynamism	Probability of Survival in Low Dynamism
Decision Logic	Highly Causal	38%	20%
	Moderately Causal	29%	44%
	Neutral	26%	23%
	Moderately Effectual	15%	17%
	Highly Effectual	26%	36%

Keywords

Effectuation, Entrepreneurial Survival, Dynamism, PSED

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Declaration

I declare that this research project is my own work. It is submitted in partial fulfillment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before to any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

_____ _____

Arné Francois Rust Date

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Ek dra hierdie navorsing op aan Mie, Shie en Andanté wat dit ‘n plesier maak om huistoe te kom en wie onuitpubare bronne van ondersteuning en geloof was oor die laaste ses en twintig jaar. Aan die Weilers vir onvoorwaardelike liefde en loyaliteit. Vir Greg Fisher wie-se insig en kritiese denke hierdie navorsing moontlik gemaak het. Aan my klasmaats by wie ek soveel geleer het en laastens aan Willemien sonder wie die uitsig na die MBA grys en ordinêr sou wees.

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1. Research Problem Definition

1.1 Research Title

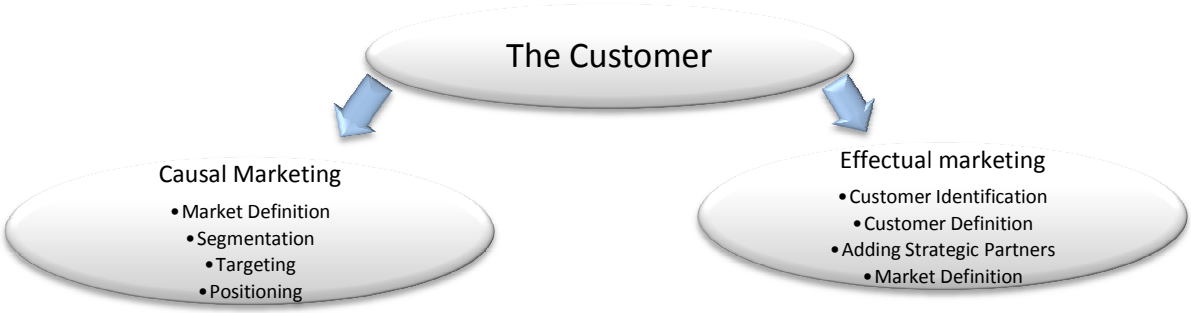
The impact of following a causation versus an effectuation approach on the survival of nascent entrepreneurial ventures in dynamic industries.

1.2 Research Problem

Since the initial attempts to define an entrepreneur as a bearer of risk and uncertainty (Cantillon, 1730; Knight, 1921) many researchers have tried to determine predictive variables in entrepreneurial survival. In fact, finding predictive variables has been described as the "holy grail" of entrepreneurial research (Sarasvathy & Dew, 2005).

A possible predictive factor was defined by Sarasvathy (2001) in her seminal work titled *Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency*. She proposed an alternative to the traditional causal view of identifying potential markets for a product, then devising marketing strategies to capture market share using the segmentation-targeting-positioning process (Kotler, 1991). She called the alternative "effectuation" and defined it as "the process by which the entrepreneur in a prefirm identifies, defines and often creates a new market for their idea, and also creates a resource base and a stakeholder network" (Sarasvathy S. D., 1999, p. Abstract 1).

athy, 2001)



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A practical example of the distinction between causation and effectuation can be explained using music.

Causation: A record company studies record sales and finds that songs with girl's names in the title do consistently better than other songs. They get a professional songwriter to write a song with a girl's name in the title. Then the company hires a singer, a guitarist, a bassist and a drummer. They give the band a name, a studio, the song and a week to rehearse. Then they put up billboards, release the single and hope that they were right. The record company's approach to the music market is causal.

Effectuation: A few guys know each other from school and play guitar together. They decide to start a band. They borrow amplifiers and a drum kit from friends and family. They make do without a bass guitar because no-one they know has one. The next step is writing some songs. This happens co-operatively and is a product of how well they play their instruments and what kind of music they like. The songs tend to be personal with the artists having no idea who would like their music except that they do. Then the band plays anywhere for anyone for as much as the people are willing to pay them. Customers identify themselves ex post by coming up to the band after a show and buying a CD. In effect, the band is "controlling" its future by only doing things within its means to achieve. The approach that the "garage band" follows is effectual.

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The research problem, in light of the above introduction, is; if you are an entrepreneur, which approach should you take to increase the probability of your venture surviving? With additional applications for creators of entrepreneur curricula and venture capitalists in deciding what to teach and which ventures to invest in.

Table 1: Causation versus effectuation (high Level (Sarasvathy & Dew, 2005))

Issue	Causal	Effectual
View of the future	Predictive	Creative
Basis for taking action	Goal oriented	Means oriented
View of risk and resources	Expected return	Affordable loss
Attitude towards outsiders	Competitive analysis	Partnerships
Attitude towards unexpected events	Avoid	Leverage

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1.3 Research Objectives

The objective of this study is to determine whether there is a relationship between entrepreneurial survival and causation or effectuation with industry dynamism as the moderating factor. This is attempted using the Panel Study for Entrepreneurial Dynamics (PSED I and PSED II) data sets. The data has been collected by the University of Michigan's Institute for Social Research from 1998 to 2003 and from 2005 to 2008 respectively. Respondents are classified as causal or effectual by matching proxy variables from the data to the causal or effectual constructs as measured by Chandler et al. (2009). The nascent firms are then classified as high, low or moderately dynamic by analyzing industry level changes in employment rates, revenues, research and development intensity and firm churn.

The survival of firms operating in highly dynamic industries are then analyzed longitudinally using both the PSED I and PSED II which gives the study a 96 month span of analysis. A means analysis of survival over the period is performed for the firms that followed a "pure" causation or effectuation approach. However, according to Chandler et al. (2009) causation and effectuation are separate constructs and can exist simultaneously depending on the context of the decision being made. The context in this instance will be the level of dynamism. Including dynamism also addresses the reservations expressed by Sarasvathy (2001) and Fisher (2009) of circumstances under which effectual logic could be beneficial. This thesis addresses the co existence of the two constructs by performing a variance analysis that takes causation and effectuation into account as a spectrum. Output from this interaction between causation, effectuation and dynamism was designed to yield "ideal" levels of causal vs. effectual logic application so as to improve the probability of entrepreneurial venture survival.

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1.4 Research Relevance

Research in entrepreneurship is generally important for six reasons as posited by Reynolds and Curtin (2007). Firstly is the creation of *new markets* by the formation of entrepreneurial enterprise (Hannan & Freeman, 1989; Caroll & Hannan, 2000; Klepper, 2002). Secondly, entrepreneurship has a positive effect on *job creation* to a greater extent than corporate business growth (Audretsch, Keilbach, & Lehman, 2006; Acs & Armington, 2004; Van Stel & Thurik, 2004). Thirdly, the recent emergence and availability of longitudinal data sets has allowed researchers to determine labour productivity as a function of whether the business is new, existing or discontinuing. Research has shown that new firms have the *highest labour productivity* and despite their size have a major impact on sectoral productivity (Foster, Haltiwanger, & Syverson, 2005). Fourthly, research has determined that small firms are responsible for *more than half of the all new innovations* (Audretsch, 1995). Fifthly, following numerous studies on the subject, modest positive associations between the level of new entries in a market, region or country and *economic growth* in subsequent periods has been robustly established (Audretsch, Keilbach, & Lehman, 2006). Lastly entrepreneurial activity has been proven to be a major mechanism *employed by immigrants to integrate themselves into a new society* (Aldrich & Waldinger, 1990; Light & Bonacich, 1988; Portes & Rumbaut, 2006).

Entrepreneurial survival research specifically, is vital to entrepreneurs, creators of entrepreneurial curricula and to venture capitalists, all of whom benefit directly from any advances made in this field. For these reasons any research aimed at improving entrepreneurial survival becomes highly relevant and essential.

1.5 Research Aims

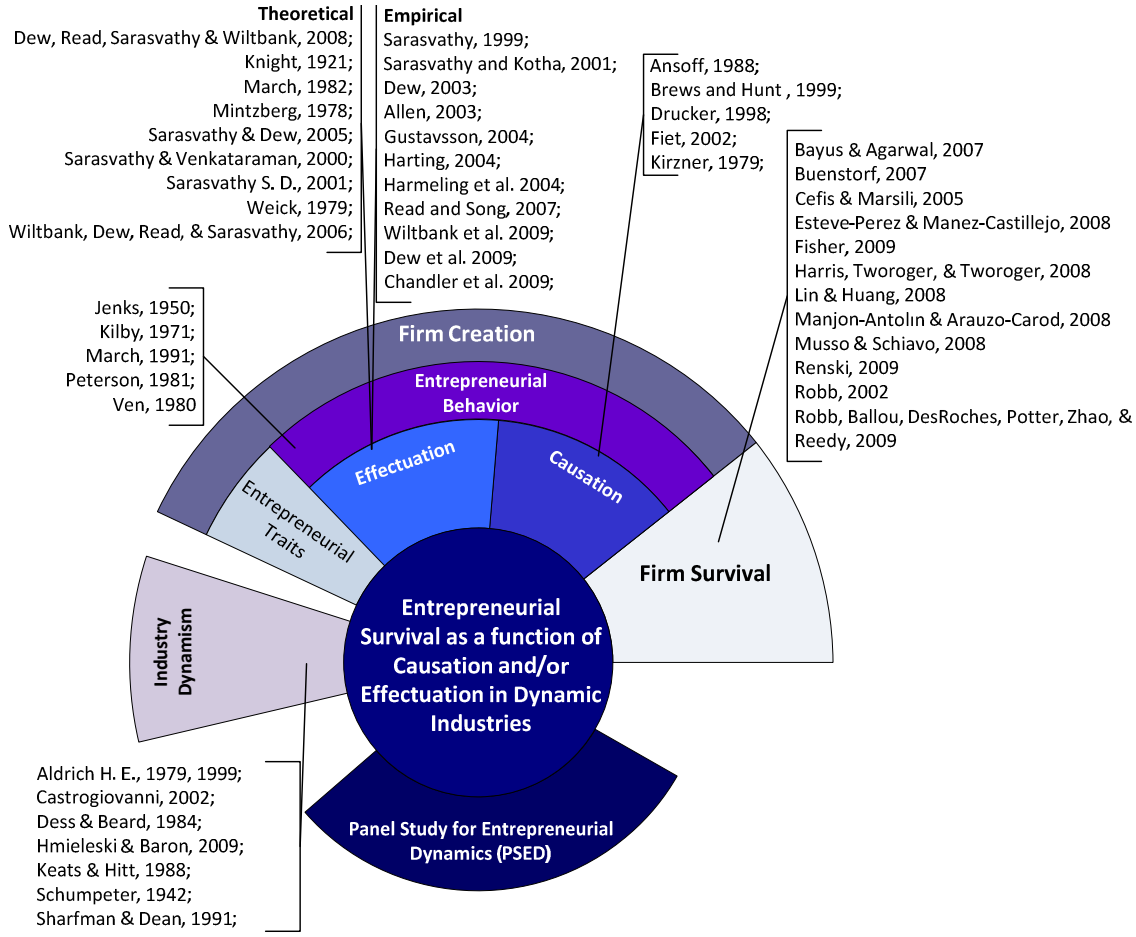
The aim of this research is to determine whether either causation or effectuation are predictive factors in entrepreneurial survival. Certain aspects of an entrepreneurial firm can exhibit causal logic, while other aspects in the same firm can follow effectual logic (Sarasvathy & Venkataraman, 2000). To address this complexity the research analyses the effect of a 'hybrid' causation/effectuation approach on survival. Research in this field has been called for directly (Sarasvathy S. D., 2001; Chandler, DeTienne, McKelvie, & Mumford, 2009) and depending on the findings will serve to promote the acceptance of Dew et al.'s *Behavioural Theory of the Entrepreneurial Firm* (2008) which emphasizes transforming environments rather than acting within extant ones. The findings will also serve to partially answer organizational creation problems such as what organization creation skills an entrepreneur needs to know (Palmer, 1971) and resource allocation problems such as "Given a firm has limited resources and usually has several choices for investment, some of which are strategic and others that are effectual, how does it decide which investments to make?" (Dew, Sarasvathy, Read, & Wiltbank, 2008, p. 325).

2. Literature Review

2.1 Introduction

The topic has three facets; **firm survival**, **firm creation** and **industry dynamism**. Firm survival is dependant on both firm creation (Read, Song, & Smit, 2009) and dynamism in terms of the industry of operation. Firm survival is a function of, among other things, the nature by which the firm is created and the industry of operation. Previously researched characteristics of firm creation can be divided into the entrepreneurial traits and the entrepreneurial behaviour. For the purpose of this study entrepreneurial traits will not be discussed as it falls outside the problem definition. Entrepreneurial behaviour will be studied in terms of the constructs of causation and effectuation (Sarasvathy S. D., 2001). Figure 2 is a diagrammatic representation of the context wherein this study will take place.

Figure 2: Literature study contextual map



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2.2 Entrepreneurial Behaviour

"Not always. Not usually. But Sometimes. They need to act before they think." (March, 1982, p. 75)

The main tenets of entrepreneurial behaviour in this study are causation and effectuation. The first areas of research hinting at what causation and effectuation was to become, was undertaken by Joseph Schumpeter (1934) in his work on adaptive processes. The next step in the evolution of causation and effectuation as a field of study was pursued by March (1991) in his study of exploration and exploitation.

Ten years later Sarasvathy (2001) termed the pursuit of controlling the future so as to reduce the dependence on prediction as effectuation. Sarasvathy and Dew (2005) then expanded on the effectual characteristic of opportunity creation as opposed to the exploration of existing opportunities for maximum return (Drucker, 1998; Kirzner, 1979; Fiet, 2002). This contrary view of approaching opportunity has also been described as objectivist (causal) and constructivist (effectual) by Harmeling (2009). Furthermore the strategic planning aspect of effectuation follows a more emergent (Mintzberg, 1978) and non-predictive (Dew, Wiltbank, Read, & Sarasvathy, 2006) process than the structured planning process (causation) espoused by Ansoff (1988) and Brews and Hunt (1999).

Causation is useful in domains where pre-existent goals, predictive rationality and environmental selection are the primary factors influencing outcomes (Sarasvathy S. D., 2001) as opposed to effectuation that takes place in a context where Marchian "goal ambiguity", Knightian "uncertainty" and Weickian "enactment" meet (March, 1982; Knight, 1921; Weick, 1979). This context is explained by making use of the following metaphor of the statistical urn containing different coloured balls.

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The metaphor explains that the hypothetical urn contains a finite number of red and blue balls. Drawing a red ball from the urn results in a reward while drawing a blue ball is penalized. If the distribution of the coloured balls in the urn is known, classical analytic techniques can be used to analyze the risk versus the reward. If the distribution of balls is unknown, estimation techniques can be used to approximate the underlying distribution which can then again be analyzed with classical analytic techniques.

Both of these approaches exemplify predictive logic and therefore causation. According to Sarasvathy and Venkataraman (2000) the effectual approach changes the logic from one of prediction to one of control. So the drawer (entrepreneur) knowing that red balls lead to rewards will endeavour to acquire and to fill the urn with red balls or to convince others already in possession of red balls to put them into the urn and jointly share the increased rewards. Barring one of these eventualities the drawer who is only in possession of green balls will change the game so that green balls win.

Below is a table adapted from Dew, Read, Sarasvathy & Wiltbank (2008) contrasting causation with effectuation.

Table 2: Summary of differences between causation and effectuation Dew et al. (2008)

Issue	Causal Position	Effectual Position
View of the future	*Prediction*. The future is a continuation of the past; can be acceptably predicted	*Design*. The future is contingent on actions by wilful agents
Constructs pertaining to individual decisions		
Givens	*Goals* are given	*Means* (who I am, what I know, and whom I know) are given
Decision agenda	*Resources*. What resources ought I to accumulate to achieve these goals?	*Effects*. What effects can I create with the means I have?
Basis for taking action	*Desired worlds*. Vision of a desired world determines goals; goals determine sub-goals, commitments, and actions	*Possible worlds*. Means and stakeholder commitments determine possible sub-goals–goals emerge through aggregation of sub-goals
Basis for commitment	*Should*. Do what you ought to do—based on analysis and maximization	*Can*. Do what you are able to do–based on imagination and satisficing
Stakeholder acquisition	*Instrumental view of stakeholders*. Project objectives determine who comes on board	*Instrumental view of objectives*. Who comes on board determines project objectives
Constructs in terms of responses to the environment		
Predisposition toward risk	*Expected return*. Calculate upside potential and pursue (risk adjusted) best opportunity	*Affordable loss*. Calculate downside potential and risk no more than you can afford to lose
Predisposition toward contingencies	*Avoid*. Surprises may be unpleasant, so invest in techniques to avoid or neutralize them	*Leverage*. Surprises can be positive, so invest in techniques that are open to them and leverage them into new opportunities
Attitude toward success/failure	*Outcomes*. Success and failure are discrete outcomes to be sought after or avoided, respectively	*Process*. Successes and failures are inputs into a process that needs to be managed such that failures are outlived and successes are accumulated
Attitude toward probability estimates	*Update beliefs*. Estimates are used in a Bayesian fashion—to update ones beliefs about the future	*Manipulate conditionals*. Estimates signal that conditionals may reified be or falsified so the future can be skewed through action
Attitude toward others	*Competition*. Constrain task relationships with customers and suppliers to what is necessary	*Partnership*. Build your market together with customers, suppliers and even prospective competitors
Underlying Logic	**To the extent we can predict the future, we can control it**	**To the extent we can control the future, we do not need to predict it**

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The first empirical descriptive study concerning effectuation was performed by Saras D. Sarasvathy (1999) on a collection of 27 entrepreneurs from diverse entrepreneurial and academic backgrounds. They had all founded companies that at the time were worth between $200 million and $6.5 billion. In solving the hypothetical problems presented to them, 74%of the participants used the effectuation model at least 63% of the time, and 44% of them at least 85% of the time. Subsequently a total of eleven further empirical studies were performed (see table 3) on different facets of the effectuation construct.

Table 3: Empirical studies of effectuation adapted from Dew et al. (2008)

Study Type	Key Results	Reference
Dissertation: protocol analysis	Induced theory of effectuation from empirical data consisting of expert "think-aloud" protocols. Found that 44% of entrepreneurs in her sample use effectuation at least 85% of the time.	(Sarasvathy S. D., 1999)
RealNetworks case study	Found evidence of all 5 key effectual constructs in the founding of RealNetworks.	(Sarasvathy & Kotha, 2001)
Dissertation: industry study	Induced process model of effectuation from historical and interview data on industry formation.	(Dew N. , 2003)
Dissertation: protocol and survey	Found a strong correlation between the use of effectuation and experience; found most psychological measures of personal traits are uncorrelated with use of effectuation (sample of MBA students).	(Allen, 2003)
Dissertation: multi-task protocol study	Validated the usefulness of the expertise lens in studying entrepreneurship.	(Gustavsson, 2004)
Carmax case study	Found 48 percent causal and 52 percent effectual decision elements in the founding process of Carmax.	(Harting, 2004)
Croatian Business School case study	Found new Croatian MBA program developed initially through an effectual logic, and gradually incorporated more causal principles as it grew across five time periods.	(Harmeling, Oberman, Venkataraman, & Stevenson, 2004)
Meta-analysis	Meta-analyses of 24 journal articles found significant relationships between venture performance and 3 effectual constructs (means-orientation, stakeholder partnering and contingency leveraging).	(Read, Song, & Smit, 2009)

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Study Type	Key Results	Reference
Survey	Found prediction and control variables were significant predictors of angel investor performance.	(Wiltbank, Read, Dew, & Sarasvathy, 2009)
Protocol analysis	Found that expert investors use a decidedly effectual logic and that MBA students use a causal logic to make decisions about starting a business.	(Wiltbank, Read, Dew, & Sarasvathy, 2009)
Protocol analysis, Survey and Expert Interviews	Developed validating information for measures of causation and effectuation and tested the dimensionality of the constructs.	(Chandler, DeTienne, McKelvie, & Mumford, 2009)

The literature on the entrepreneurial role of creating an organization as studied by Jenks (1950), Kilby (1971), Peterson (1981) and Van de Ven (1980) is only included in the literature contextual map for the sake of comprehensiveness and to provide subsequent readers of this document convenience in researching organizational creation.

2.3 Industry Dynamism

"We demand guaranteed rigidly defined areas of doubt and uncertainty" (Adams, 1979)

According to Aldrich (1999) uncertainty is an integral part of studying the relationship between any business and its environment. He is supported by a long line of researchers whose primary objective has been to define the construct of uncertainty and determine its effects (Downey & Slocum, 1975; Duncan R. , 1972; Duncan R. , 1973; Jauch, Osborn, & Glueck, 1980; Miller, 1988). Although much work has gone into the field there seems to be no consensus on the definition of uncertainty.

This study follows a similar approach to that employed by Hmieleski & Baron (2009) which approximates the effects of uncertainty with dynamism. Industry dynamism is determined by analyzing the job creation and destruction rates, the changes in revenues, the research and development intensity and lastly the entry and exit rates of firms per industry. Combining these factors provide a clear representation of industry dynamism.

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It is this factored industry dynamism that will function as the moderating variable of industry uncertainty in this study. The influence of each factor will be determined using the standard error of each factor's regression slope, following the work of Dess and Beard (1984), Keats & Hitt (1988), Sharfman & Dean (1991), and Castrogiovanni (2002).

Hmieleski & Baron (2009) state that the number of employees is a general measure for uncertainty in the research of new businesses, and as such used the net number of employees per industry as one of their dynamism factors. This study differs from theirs in that it uses job creation and destruction rates as measures of uncertainty. The researcher believes that using the rates of job creation and destruction will include the substitution effect between the two, thus giving a better approximation of the real dynamism taking place in an industry. Changes in industry revenue was used by Keats and Hitt (1988) and Sharfman and Dean (1991) as a measure of uncertainty and as such is included here.

Research and development intensity was included because it captures the rate of technological change taking place in an industry (Castrogiovanni, 2002; Dess & Beard, 1984). Lastly the number of establishments in an industry has been used by Aldrich (1979) as a measure of industry change but once again the researcher has chosen to expand the definition to the rate of establishment entry and exit in an industry to cater for Schumpeter's *creative destruction* (Schumpeter, 1942). Except for the legitimate academic underpinnings the author believes that using the magnitude of change in the abovementioned variables to estimate uncertainty makes logical sense and will provide a sufficiently accurate approximation of uncertainty as a moderating variable for entrepreneurial survival.

2.4 Entrepreneurial Firm Survival

"The only thing I knew how to do, was keep on keeping' on like a bird that flew." (Dylan, 1975)

Firm performance is defined by Sarasvathy and Venkataraman (2000, p. 26) as "profitability in the short run and survival and growth in the end." Predictive variables of entrepreneurial survival that have been empirically analyzed are demographics (Robb A. M., 2002), revenue versus expenses, legal form, intellectual property (Robb, Ballou, DesRoches, Potter, Zhao, & Reedy, 2009), urban versus suburban and rural areas (Renski, 2009), spin-offs from parent company (German laser industry specific) by Buenstorf (2007), information systems (Harris, Tworoger, & Tworoger, 2008), pre-entry experience, entry timing and product technology strategies (Bayus & Agarwal, 2007), resource based theory (Esteve-Perez & Manez-Castillejo, 2008), technological regimes (Lin & Huang, 2008), innovation (Cefis & Marsili, 2005) and the impact of financial constraints (Musso & Schiavo, 2008). For a detailed analysis of the findings from the above analyses please refer to the meticulously comprehensive article "Firm survival: methods and evidence" by Manjon-Antolın & Arauzo-Carod (2008). Yet, according to Manjon-Antolın & Arauzo-Carod (2008) researchers have not exhausted the economic and statistical dimensions in their analysis of firm survival.

2.5 The Gap in Current Literature

The researcher has identified that no study has yet been performed on entrepreneurial survival as a function of "pure" decision logic (causation and effectuation) or on the interactive effect of causation and effectuation on entrepreneurial survival. The inclusion of uncertainty as the industry change dimension addresses the contextual influence of the decision as described by Sarasvathy and Dew (Sarasvathy & Dew, 2005), Chandler et al (2009) and Fisher (2009).

2.6 Problem Statement

In light of the above, entrepreneurial firm creation is highly significant and research contributing to predicting survival will be valuable to academia, entrepreneurs, creators of entrepreneurship curricula and venture capitalists. Therefore this thesis will determine whether causation, effectuation or a mix of the two decision logics, used in the context of a robust industry dynamism approximation, are predictive factors of entrepreneurial survival.

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3. Research Hypotheses

3.1 Introduction

The research aim is to determine whether causation, effectuation, or a combination of the two, act as predictive factors to firm survival within the context of high and low dynamism industries.

3.2 Proxy Variable Definition

Proxy variables were identified from Sarasvathy's definition of effectuation (1999), the guidelines to determine effectuation deduced by Read, Song and Smit (2009) and the measures of effectuation described by Chandler, DeTienne, McKelvie, & Mumford (2009).

From the analysis, the researcher decided to use Chandler et al.'s (2009) measures to identify the applicable questions from the PSED questionnaires. The reasons for this are uniformity of parameters between subsequent studies and a concern that creating a hybrid definition will invalidate the "constructual" factors found by Chandler et al. (2009).

Below are the measures and their variable identifiers.

Table 4: Causal and effectual measures (Chandler, DeTienne, McKelvie, & Mumford, 2009)

Causation Measures	ID
We analyzed long run opportunities and selected what we thought would provide the best returns	*C1*
We designed and planned business strategies	*C2*
We designed and planned production and marketing efforts	*C3*
We developed a strategy to best take advantage of resources and capabilities	*C4*
We had a clear and consistent vision for where we wanted to end up	*C5*
We organized and implemented control processes to make sure we met objectives	*C6*
We researched and selected target markets and did meaningful competitive analysis	*C7*

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Effectuation Measures	ID
Affordable loss	
We adapted what we were doing to the resources we had.	*E1*
We allowed the business to evolve as opportunities emerged.	*E2*
We avoided courses of action that restricted our flexibility and adaptability.	*E3*
We were careful not to commit more resources than we could afford to lose.	*E4*
We were careful not to risk more money than we were willing to lose with our initial idea.	*E5*
We were careful not to risk so much money that the company would be in real trouble financially if things didn't work out.	*E6*
We were flexible and took advantage of opportunities as they arose.	*E7*
Experimentation	
The product/service that we now provide is essentially the same as originally conceptualized.	*E8*
The product/service that we now provide is substantially different than we first imagined.	*E9*
We experimented with different products and/or business models.	*E10*
We tried a number of different approaches until we found a business model that worked.	*E11*
Pre-commitments	
We used a substantial number of agreements with customers, suppliers & other organizations and people to reduce uncertainty.	*E12*
We used pre-commitments from customers and suppliers as often as possible.	*E13*

A self administered questionnaire extracted from the PSED II has been included in Appendix A. This is done to enable an entrepreneur to score his/her decision logic on the causal/effectual scale used in this study and to thereby apply the findings from this study to their businesses.

3.3 Dynamism Coding

In order to establish industry level dynamism the researcher determined the standard errors of six regression slopes. The variables that these slopes approximate are job creation and destruction rates, industry revenues, research and development intensity and lastly the entry and exit rates of firms per industry as defined by the Standard Industrial Classification (SIC) index.

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All the variables were regressed as a function of time and standardised to account for absolute differences between them. All the data were obtained from the U.S Bureau of the Census Business Dynamism Statistics except for the research and development intensity data that were obtained from the U.S National Science Foundation (NSF). The next step was to map the industry dynamism index which is classified according to SIC convention to the North American Industry Classification System (NAICS). This allowed associating a case in the PSED classified by NAICS with a dynamism class that was classified using the SIC code (see table 5).

Table 5: SIC to NAICS translation table

Code	NAICS	SIC
11	Agriculture, Forestry, Fishing and Hunting	Agriculture
23	Construction	Construction
21	Mining, Quarrying, and Oil and Gas Extraction	Mining
44-45	Retail Trade	Retail
52	Finance and Insurance	FIRE
53	Real Estate and Rental and Leasing	FIRE
31-33	Manufacturing	Manufacturing
42	Wholesale Trade	Wholesale
22	Utilities	TCU
48-49	Transportation and Warehousing	TCU
51	Information	TCU
54	Professional, Scientific, and Technical Services	Services
55	Management of Companies and Enterprises	Services
56	Administrative, Support, Waste Management and Remediation Services	Services
61	Educational Services	Services
62	Health Care and Social Assistance	Services
71	Arts, Entertainment, and Recreation	Services
72	Accommodation and Food Services	Services
81	Other services (except public administration)	Services

A full list of the industries in NAICS is provided in Appendix B. This is done for entrepreneurs to determine the dynamism more specific to his/her industry, and to apply the findings from this research accordingly.

3.4 Objective

In light of the literature reviewed above the following research hypotheses are proposed.

Firm survival is defined as the proportion of either causal (F_C) or effectual (F_E) firms operating in either a low ($F_{C,Low\ D}\ or\ F_{E,Low\ D}$) or high dynamism industry ($F_{C,High\ D}\ or\ F_{E,High\ D}$) left by the fourth iteration of PSED I and PSED II. In order to determine whether the firm followed causal or effectual decision logic the proxy variables identified from Chandler et al. (2009) were scored as either causal or effectual depending on the reply for the relevant question in the PSED. The result is a total score ranging from "pure" causality (-7) to "pure" effectuation (+7) with a balanced approach being neutral (0). For example $\frac{F_{C\ (t=4,High\ D)}}{F_{C(t=1,High\ D)}}$ is the number of "pure" causal firms operating in highly dynamic industries left in year four as a proportion of the initial number of "pure" causal firms operating in highly dynamic industries.

The analyses focus specifically on highly dynamic industries. The reason for this is that Sarasvathy and Dew (2005) believe effectuation to be more applicable in uncertain contexts ∴ highly dynamic industries. Low dynamism is included in the variance analysis to compare the interaction between causation and effectuation across the uncertainty spectrum.

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The positive relationship between effectuation and venture performance (Read, Song, & Smit, 2009) and the higher percentage of 'expert' entrepreneurs who use effectuation (Dew, Read, Sarasvathy, & Wiltbank, 2009) prompt the researcher to designate the **null hypothesis for the "pure" approach** ($\boldsymbol{H_{O\,"Pure"}}$) as a neutral or positive correlation between firm survival and "pure" *effectuation* (F_E) as a predictive variable in highly dynamic industries. ∴ ($F_{E,High\,D}$)

$$\boldsymbol{H_{O\,"Pure"}}: \frac{F_{E\,(t=4,High\,D)}}{F_{E(t=1,High\,D)}} - \frac{F_{C\,(t=4,High\,D)}}{F_{C(t=1,High\,D)}} \leq 0$$

Alternative hypothesis for the "pure" approach ($\boldsymbol{H_{A\,"Pure"}}$) states that there is a positive correlation between firm survival and "pure" *causation* (F_C) as a predictive variable in highly dynamic industries.

$$\boldsymbol{H_{A\,"Pure"}}: \frac{F_{E\,(t=4,High\,D)}}{F_{E(t=1,High\,D)}} - \frac{F_{C\,(t=4,High\,D)}}{F_{C(t=1,High\,D)}} > 0$$

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Null hypotheses in high dynamism ($\boldsymbol{H_{0\ High\ D}}$): Groups were created to test for firm survival across the spectrum from "pure" causation to "pure" effectuation. The groups were created using the decision logic scores from highly causal (-7,-5), moderately causal (-4,-2) and neutral (-1, 1) to moderately effectual (2,4) and highly effectual (5,7). Survival at the fourth iteration ($FS_{(t=4)}$) is now compared between the five groups listed above. The variance in survival is tested between the groups to establish whether any one of the groups has a significantly better probability of surviving. The dependant variable is still survival, the causation/effectuation group is the independent variable and high industry dynamism is the moderating variable. As a result of using ANOVA the null hypotheses states that all groups are associated. Hence, finding that any group out or underperforms the others will lead to $H_{0\ High\ D}$ being disproved.

$$\boldsymbol{H_{0\ High\ D}}: FS_{(t=4,High\ D)} = for\ all\ Groups\ \{HCaus, MCaus, N, MEff, HEff\}$$

$$\boldsymbol{H_{A\ High\ D}}: FS_{(t=4,High\ D)} \neq for\ all\ Groups\ \{HCaus, MCaus, N, MEff, HEff\}$$

Null hypotheses in low dynamism ($\mathbf{H_{0\ Low\ D}}$)**:** Survival at the fourth iteration ($\mathrm{FS_{(t=4)}}$) is the dependent variable, the causation/effectuation group is the independent variable and low industry dynamism is the moderating variable. Again as a result of using ANOVA the null hypotheses state that all groups are associated. Hence, finding that any group out or underperforms the others will lead to $\mathrm{H_{0\ Low\ D}}$ being disproved.

$$\boldsymbol{H_{0\ Low\ D}}: FS_{(t=4,Low\ D)} = for\ all\ Groups\ \{HCaus, MCaus, N, MEff, HEff\}$$

$$\boldsymbol{H_{A\ Low\ D}}: FS_{(t=4,Low\ D)} \neq for\ all\ Groups\ \{HCaus, MCaus, N, MEff, HEff\}$$

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3.5 Consistency Matrix

Table 6: Research hypotheses consistency matrix

Research Hypotheses	Literature Review	Data	Analysis
$H_{0\ "Pure"}$ **Effectuation is a better predictor than causation of nascent entrepreneurial venture survival in highly dynamic industries**	Chandler et al. 2009; Dew et al. 2009; Dess and Beard, 1984; Read and Song, 2007; Sarasvathy, 1999, 2001; Sarasvathy & Dew, 2005; Sarasvathy & Venkataraman, 2000; Aldrich, 1979, 1999; Castrogiovanni, 2002; Dess & Beard, 1984; Hmieleski & Baron, 2009; Keats & Hitt, 1988; Schumpeter, 1942; Sharfman & Dean, 1991;	PSED I and PSED II	Mean Comparison Test (Paired T-Test)
$H_{A\ "Pure"}$ **Causation is a better predictor than effectuation of nascent entrepreneurial venture survival in highly dynamic industries**			
$H_{0\ High\ D}$ **There is no statistically significant difference in survival between following a highly causal, moderately causal, neutral, moderately effectual or highly effectual approach in highly dynamic industries**		PSED I and PSED II	Multiple Variance Analysis (ANOVA) and Post-Hoc Analysis
$H_{A\ High\ D}$ **There is a statistically significant difference in survival between following a highly causal, moderately causal, neutral, moderately effectual or highly effectual approach in highly dynamic industries**			
$H_{0\ Low\ D}$ **There is no statistically significant difference in survival between following a highly causal, moderately causal, neutral, moderately effectual or highly effectual approach in low dynamism industries**			
$H_{A\ Low\ D}$ **There is a statistically significant difference in survival between following a highly causal, moderately causal, neutral, moderately effectual or highly effectual approach in low dynamism industries**			

4. Research Methodology

4.1 Introduction

A quantitative causal (relational) research design was used to address the above mentioned hypotheses.

4.2 Unit of Analysis

The unit of analysis is entrepreneurial survival.

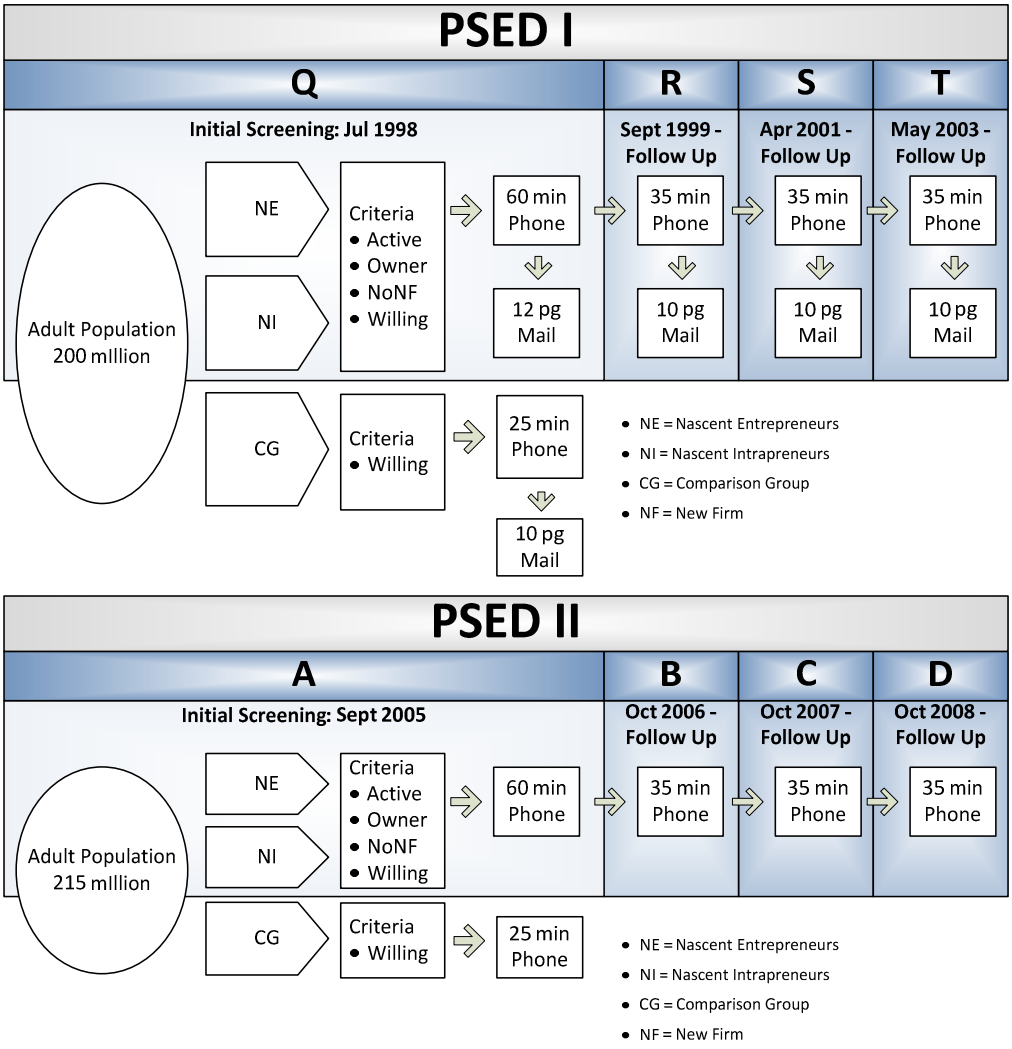
4.3 Population of Relevance

The population of relevance for this study are adults (aged > 18) in the continental United States who are starting a business (alone, with others or for their companies), expect to have ownership in the business, have been involved in the start-up process during the last 12 months and where the business is still in the gestation phase (*not* an infant firm).

4.4 Sampling Method and Size

A representative sample of the US population was identified by the PSED research team, by administering random telephone screenings. Random digit dialling techniques were used to avoid the problem of households with unlisted telephone numbers. The PSED Screening Questionnaire (1998) was administered to each sample wave of 1000 calls and was completed in a 3 day period with a three call criterion (initial call and two call-backs). The process started in July 1998 and finished in April 1999 with a total number of 64 622 people sampled. At completion a total of 1261 respondents qualified as nascent entrepreneurs for the PSED I study. The process was repeated in September of 2005 and resulted in an additional 1214 nascent entrepreneurs being identified who were willing to take part in the PSED II (see figure 3 below).

Figure 3: PSED research design overview



After the initial contact the respondents were contacted successively in four waves (12-18 months apart). The final PSED dataset (in its current form) contains approximately 1,200 variables in each of the four waves for both the PSED I and PSED II iterations. This brings the total to a staggering 8 100 variables applied to 2475 cases over a span of eight years. The PSED is representative of the US adult population due to relatively high response rates and weights used to correct for differences in selection probabilities and non-response rates.

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To date the data in the PSED has been used to write, among others, 82 peer reviewed articles, 11 books, 58 chapters of books and 19 dissertations/theses (Davidsson, Reynolds, Hechavarria, Frid, & Gordon, 2010). The PSED data set is in the public domain and as such can be accessed from their website at http://www.psed.isr.umich.edu/psed/home. The enormity and quality of the PSED dataset affords the researcher with unparalleled opportunity to avoid the survival bias typical of nascent entrepreneurial studies. The longitudinal nature of the study also avoids the recollection bias so prevalent in cross-sectional surveys.

4.5 Data Collection

The data used in this study were obtained from the Panel Study of Entrepreneurial Dynamics (PSED) (Gartner, Shaver, Carter, & Reynolds, 2004). The set contains a vast array of longitudinal data from individuals in the process of entrepreneurial start-up. Codebooks for the PSED I and II initiatives can be obtained from http://www.psed.isr.umich.edu/psed/data.

4.6 Data Analysis Approach

The approach taken to analyse the data can be broken into four steps. The first was *acquiring the necessary data*. The PSED datasets was acquired to determine whether an entrepreneur followed a causal or an effectual approach, and if the entrepreneurial venture survived for the duration of the study. Data from the US Bureau of the Census and the National Science Foundation (NSF) was acquired to determine the magnitude of the environmental dynamism moderating variable.

The second step was to *transform the data* so that the research hypotheses (decision logic approach, survival and dynamism) could be tested. This was achieved by identifying proxy variables in the PSED datasets that approximate the causal and effectual constructs. Persistence was determined by establishing if a venture survived for the duration of either of the studies and if not, when the venture was classified as discontinued.

Industries were then categorised as high, moderate or low dynamism using year on year standard deviation data to create a dynamism index. This dynamism index was then matched to the PSED on a case by case basis using the first two digits of each PSED case's NAICS code.

The third step was *coding the data for statistical analysis*. The relevant variables were extracted from the PSED and were coded as to whether a causal or an effectual approach was taken. The extracted variables were also weighted to ensure that the sample remained representative of the US population. Using this, a total "causation or effectuation" score was determined for each case. The scores were then grouped on a spectrum from highly causal to highly effectual. Next the cases were coded as persistent or discontinued and as high, moderate or low dynamism. Below (table 7) is an example of what state the data were in after step three.

Table 7: Sample meta-data example for analysis

Resp ID	Dynamism Coding	Persistent or Discontinued	Case Weighting	Causal/Effectual Score	Causal/Effectual Group
50658	High	0 (discontinued)	0.74	-6	Highly Causal
50659	Moderate	1 (persistent)	1.89	-1	Neutral

The fourth and last step was *statistically analyzing the data*. Descriptive statistics were run on the sample against which the hypotheses were to be tested. The descriptive statistics included testing for anomalies in the data, testing the assumptions required for the variance analysis and determining the internal validity of the dynamism variables. ANOVA was then used to test for statistically significant differences between the groups and thereby to answer the hypotheses stated above.

4.7 Identifying Proxy Variables and Survival

Below (table 8) are the causal and effectual constructs previously illustrated in table four. This table now has added columns for the proxy variables defined from the PSED questionnaires and their variable identifiers.

Table 8: Causation, effectuation and the proxy variables from the PSED

		PSED I		PSED II	
Causal Construct Chandler et al. (2009)	**ID**	**Q #**	**Definition**	**Q#**	**Definition**
We analyzed long run opportunities and selected what we thought would provide the best returns	*C1*	Q 277	Second Mortgage – Yes *Rationale: This approach to gathering the required resources to maximise the potential "upside" benefit falls clearly under causal reasoning	AA5	Obtaining funding from outside investors, saving the required capital and selling one's home to finance a start-up are all causal characteristics
We designed and planned business strategies	*C2*	Q 114	Formally written Business Plans	AD2	Formally written Business Plans
				AA9	The fact that the business was born out of an idea (from self or other) as opposed to from past work experience or a hobby indicates that the entrepreneur involved does not at the outset have the means to deliver on that idea, the pursuit of that idea = Causation
We designed and planned production and marketing efforts	*C3*	-	-	-	-
We developed a strategy to best take advantage of resources and capabilities	*C4*	Q 327	Cognitive Style Q327 – 1 (Adaptor) *Rationale: The adaptor questions centres on "doings things better" which implies an approach to improving existing methods of work/existing products	-	-
We had a clear and consistent vision for where we wanted to end up	*C5*	-	-	AA6	Start-up problems in reaching that vision 17. Start-up costs 23. Acquiring other capital/money; financing 40. Researching/acquiring information on competitors 41. Price competition 42. Market competition 43. Competition – NFS 80. Acquiring information on business plans 81. Developing a business plan 82. Forecasting future costs 83. Scheduling/time management 84. Accounting 85. Acquiring location 86. Acquiring supplies 90. Acquiring experience/education *Rationale: The problems listed above are indicative of an entrepreneurs' need to secure resources in order to achieve certain goals which is a causal logic approach
We organized and implemented control processes to make sure we met objectives	*C6*	-	-	AD6	Prototype/procedure tested with customers 3. Model/procedure is being developed 4. Still in the idea stage; no work done yet *Rationale: The product development lifecycle above follows a causal approach as compared to the product evolution approach of effectuation
				AY13	Uncertainty appetite, like going in not really knowing what will happen 4. Disagree 5. Strongly disagree *Rationale: The causal principle of reducing risk by avoiding situations where risk is inherent
We researched and selected target markets and did meaningful competitive analysis	*C7*	rk1j	Followed a systematic process to search for viable business ideas	AA5	90. Can do better than the competition; improve on current ways of doing things
		Q 134 & 135	Market Opportunity Definition has been or will be Completed	AD24	Define the Market Opportunity - Yes
		-	-	AD22	Collected information about competition

		PSED I		PSED II	
Effectual Construct Chandler et al. (2009)	**ID**	**Q #**	**Definition**	**Q #**	**Definition**
Affordable loss	-	-	-	-	-
We adapted what we were doing to the resources we had.	*E1*	Q 134 & Q135	Market Opportunity Definition is not applicable	AA5	Opportunity Screening 10. Low overhead 11. Low cost property; have property 14. Low start-up costs 45. Good product; faith in product; like product 46. Expansion of old/current business 48. Opportunity to buy building, property or business *Rationale: The effectual principle of "making do with what you have" can be clearly seen above
		-	-	AA9	*Source of the business:* 01. Current work activity 02. Previous work activity 03. Separate business now own and manage 04. Hobby or recreational past time *Rationale: Same as above
		-	-	AD6	Product is Completed and ready for sale or delivery *Rationale: A completed product before the business moves out of the nascent phase indicates that the venture is using existing means to achieve a goal as opposed to the causal approach of obtaining the means to achieve a goal
We allowed the business to evolve as opportunities emerged.	*E2*	Q 114	Unwritten and informally written business plans	AD2	Unwritten and informally written business plans
We avoided courses of action that restricted our flexibility and adaptability.	*E3*	Q 327	Cognitive Style Read Q 327 – 2 (Innovator) *Rationale: The innovator questions centres on "doings things differently" which implies an approach that changes the status quo	-	-
We were careful not to commit more resources than we could afford to lose.	*E4*			-	-
We were careful not to risk more money than we were willing to lose with our initial idea.	*E5*	-	-	-	-
We were careful not to risk so much money that the company would be in real trouble financially if things didn't work out.	*E6*	Q 277	Second Mortgage – No *Rationale: This approach to minimising the potential "downside" effect of failure falls clearly under effectual reasoning	-	-
We were flexible and took advantage of opportunities as they arose.	*E7*	-	-	AD24	There is no market opportunity definition
Experimentation		-	-	-	-
The product/service that we now provide is essentially the same as originally conceptualized.	*E8*	-	-	-	-
The product/service that we now provide is substantially different than we first imagined.	*E9*	-	-	-	-
We experimented with different products and/or business models.	*E10*	rk1l	Generally and Opportunity Recognition = Completely Agree with Several learning steps over time	-	-
We tried a number of different approaches until we found a business model that worked.	*E11*	-	-	AY13	Uncertainty appetite, like going in not really knowing what will happen 1. Strongly agree 2. Agree
Pre-commitments		-	-	-	-
We used a substantial number of agreements with customers, suppliers & other organizations and people to reduce uncertainty.	E12	-	-	-	-
We used pre-commitments from customers and suppliers as often as possible.	*E13*	-	-	-	-

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Survival	PSED I		PSED II	
Persistent if:	R, S, T 502	Operating business or active startup	B, C, D, A50	New Firm or Active Startup
Discontinued if:	R, S, T 502	Currently Inactive or no longer being worked on	B, C, D, A50	If Quit
NOTE: Blank instances not followed by classification as operating or active are assumed discontinued				

4.8 Research Methodology Limitations

The research approach followed suffers from four primary limitations. The first is that industry dynamism could only be determined on a very "high-level". By "high level" the researcher is referring to classifying the 1400 industries in the NAICS into ten overarching categories. This had to be done because the Business Dynamics Study (BDS), run by the US Bureau of the Census, only publishes data on the ten industry level thus making any more detailed analysis impossible.

The second limitation also concerns industry dynamism in that the industry revenue and industry innovation level data was incomplete. This is due to industries believing that publishing the information would result in a loss of competitive advantage. However, the researcher believes the first limitation serves to limit the impact of the second. If a more detailed industry level split was performed, the incomplete data would have had a more pronounced effect.

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The third limitation of the method used is that the PSED was not designed to test for causation and effectuation making the proxy variables identified a possible area of contention. The external validity of the findings are dependent on the 'quality' of the proxy variables identified. Quality in this instance means how closely the questions match the characteristics of causation and effectuation as defined by Sarasvathy (2001).

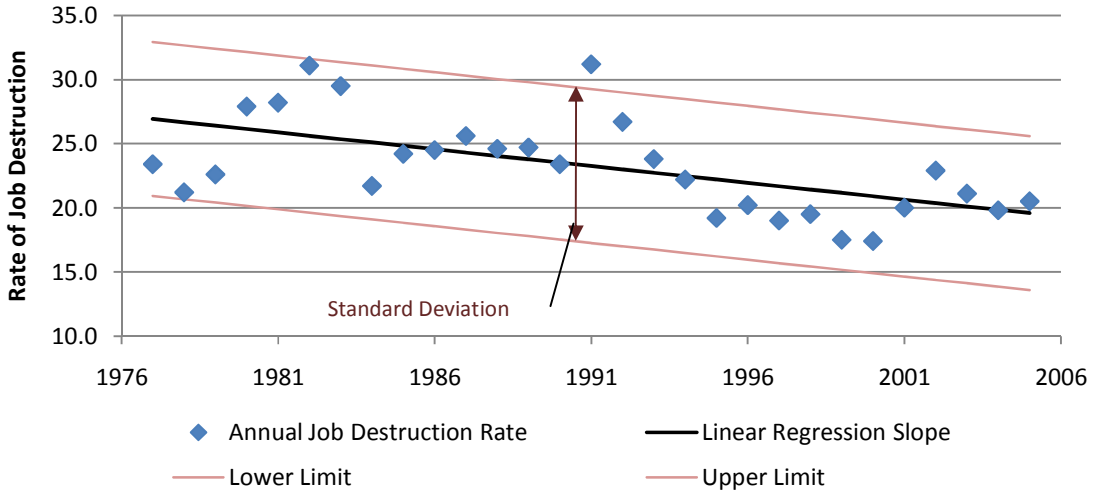
The fourth limitation of the method followed is that this thesis does not determine the impact of causation or effectuation on entrepreneurial success as defined by Fisher (2009). In his definition Fisher includes quick cheap failure as a form of success and drawn out unprofitable survival as a form of failure. This study only determines the impact of decision logic on venture survival *per se*.

5. Results and Discussion

5.1 Determining Dynamism

In order to create the dynamism index, historic data for six variables were collected over the industries under analysis. A regression analysis was then performed for each variable using time as the independent variable. As a measure of uncertainty and thus dynamism the standard deviation of each regression function was divided by the slope of the function. Below is an example of the process using the job destruction variable (figure 4).

Figure 4: Job destruction dynamism analysis in the Construction Industry



Logically the index is based on how much each of the variables changes over the period (standard deviation). Thus it is based on the uncertainty of job and venture creation and destruction and on the variability in revenues and innovation. The contribution of each industry to this uncertainty and variability is then determined to rank the industries according to their total contribution to dynamism (table 9). This resulted in a comparable scale of dynamism for each variable under review. The scale was then normalized so that each industries' contribution to each variable's dynamism could be determined.

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For example, the retail industry contributes 14% of the dynamism to the business entry variable, and 13% to the revenue variable. The contribution of all the industries to the various variables was then summed and sorted from highest contributor to lowest contributor.

Table 9: Industry dynamism Index

Industry	Business Entry	Business Exit	Job Creation	Job Destruction	R&D Intensity	Revenue	Contribution	Class
Retail	14%	30%	19%	26%	7%	13%	108%	High
Services	7%	11%	14%	4%	0%	48%	84%	High
Manufacturing	22%	11%	10%	0%	38%	2%	84%	High
Construction	12%	16%	14%	18%	3%	12%	74%	Mod
Agriculture	14%	11%	16%	21%	0%	2%	64%	Mod
Mining	11%	11%	8%	5%	19%	6%	60%	Mod
Wholesale	15%	5%	15%	8%	7%	4%	53%	Low
Transport, Communications and Utilities	4%	4%	4%	1%	17%	3%	32%	Low
Financial, Insurance and Real Estate	1%	1%	0%	18%	10%	11%	20%	Low
	100%	100%	100%	100%	100%	100%		

(Note: The turquoise used for the highly dynamic and the orange used for the low dynamism is applied consistently to distinguish between the two contexts in the analysis that follows)

The contributions per industry range from as low as 20% (Finance, Insurance and Real Estate) to as high as 108% (Retail). The industries were then categorised as highly dynamic if their contributions exceeded 80% and as low dynamism if the contribution fell below 60%. To evaluate the internal consistency of the index a reliability analysis was performed in SPSS yielding a Cronbach Alpha of .743. This figure gives credence to the index and is in line with the .69 Cronbach coefficient determined by Hmieleski & Baron (2009) for the index used in their study.

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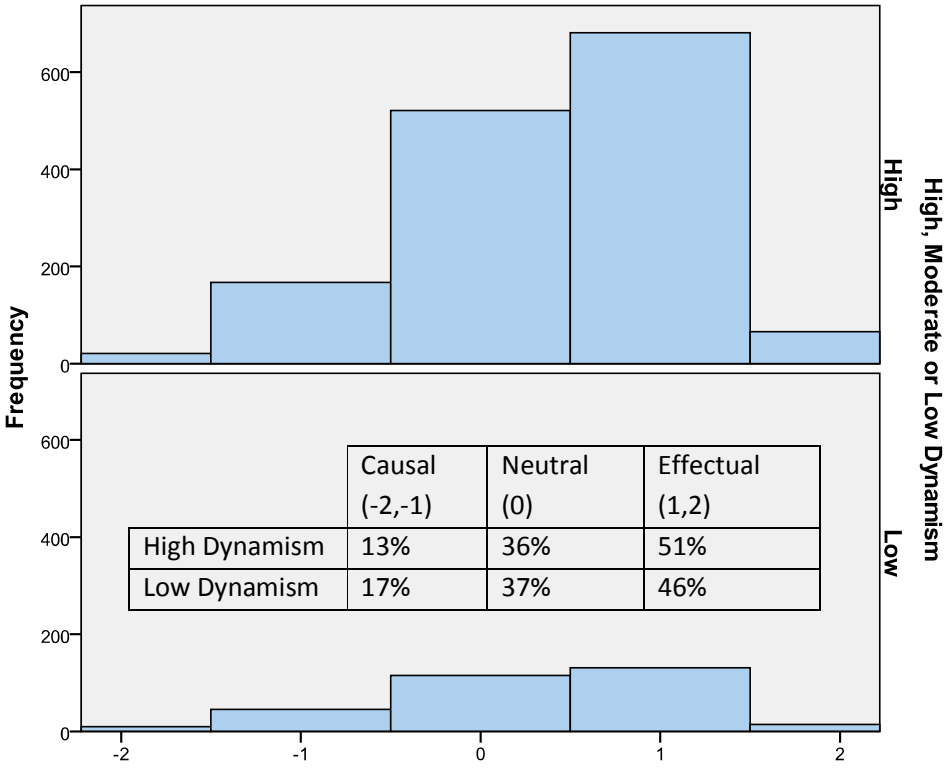
5.2 Analyzing the Data for Anomalies

The first section of this chapter will describe the dataset to familiarize the reader with its characteristics. The researcher believes this familiarity will allow the reader to better interpret the findings from the statistical analyses. The second section will test the assumptions required for the statistical analyses to be considered internally valid.

Figure 5 compares the decision logic (highly causal to highly effectual) followed by the cohorts in the high and low dynamism industries. From the histogram it can be deduced that there are many more nascent firms in high dynamism industries than in low dynamism industries and that the logic for both is slightly skewed to a more effectual approach. Furthermore the incidence of effectuation is slightly higher in highly dynamic industries (51% high versus 46% low) while the same is true for causation in low dynamism industries (17% low versus 13% high).

Figure 5: Causal vs. effectual reasoning histogram



	Causal (-2,-1)	Neutral (0)	Effectual (1,2)
High Dynamism	13%	36%	51%
Low Dynamism	17%	37%	46%

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Figure 6 shows the histogram comparing firm discontinuance with persistence for highly, low and moderately dynamic industries. The percentage firms surviving per approach are:

- High = 21.5% survival
- Low = 23.8% survival
- Moderate = 24.2% survival

These figures are below the accepted survival rate of 44% over a four year period as published by the Bureau of Labor Statistics.

Figure 6: Percentage surviving firms comparison

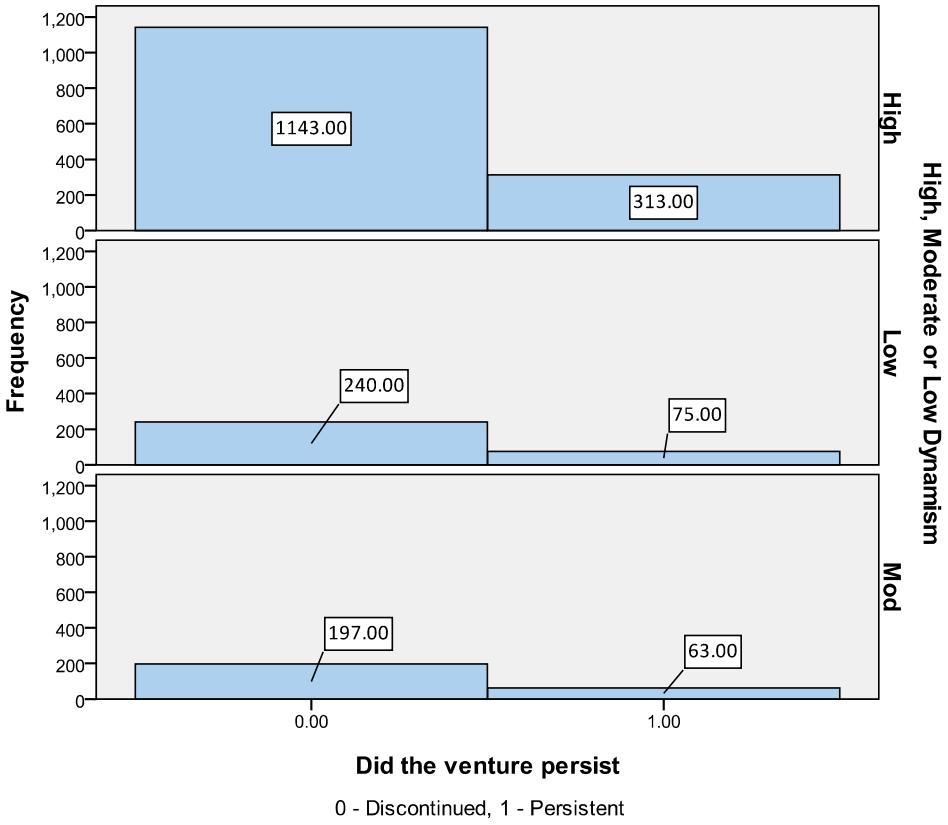

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Figure 7 below tests the normality of the population under analyses while table 10 shows the homogeneity tests of both the high and low dynamism cohorts. According to the results, the data is suitable for ANOVA because of normality and homogeneity.

Figure 7: Testing for normality in the sample population

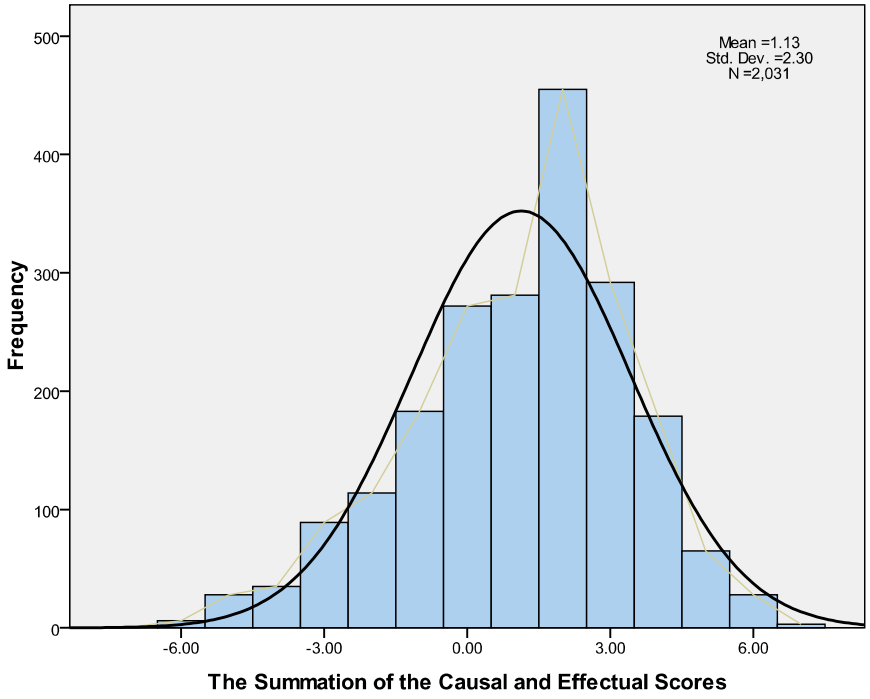

Table 10: Testing for homogeneity in the sample population

		Levene Statistic	df1	df2	Sig.
High Dynamism	Based on Mean	34.236	4	1451	.000
	Based on Median	8.367	4	1451	.000
	Based on Median and with adjusted df	8.367	4	1387.584	.000
Low Dynamism	Based on Mean	8.993	4	310	.000
	Based on Median	3.979	4	310	.004
	Based on Median and with adjusted df	3.979	4	295.000	.004

In light of the above results the researcher is 99% confident ($sig. \leq 0.01$) in using means analysis tests (paired and multiple) to test the hypotheses stated in chapter three for both high and low dynamism industries.

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5.3 Survival in "Pure" Causation and Effectuation Approaches ($\mathbf{H_{O\ "Pure"}}$ & $\mathbf{H_{A\ "Pure"}}$)

After scoring each of the proxy variables it was found that out of the entire cohort of 1771 qualifying establishments, only two ventures from the PSED I cohort scored "pure" effectuation (7/7) for their approach to decision logic. No establishments in either of the cohorts followed a "pure" causal approach.

The above finding indicates that there is no such thing as a "pure" causal or effectual approach in practice. This *disproves the null and first alternative hypotheses* ($H_{O\ "Pure"}$ *and* $H_{A\ "Pure"}$) because not only is neither of the approaches a better predictor of survival, there are practically no entrepreneurs who follow "pure" causal or effectual logic.

5.4 Survival on a spectrum from Causation to Effectuation in High Dynamism ($\boldsymbol{H_{0\ High\ D}}$ & $\mathbf{H_{A\ High\ D}}$)

In order to test the above hypotheses in high dynamism industries an ANOVA analysis was performed. The output from the analysis can be seen in table 11 below.

Table 11: ANOVA output for high dynamism industries

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.540	4	1.385	8.367	.000
Within Groups	240.174	1451	.166		
Total	245.714	1455			

The F-value for $\mathrm{F}(4,1451) = 3.33, \alpha = 0.01 \ \therefore \mathrm{F} = 8.367 > 3.33$ disproves the null hypotheses ($\mathrm{H}_{0\ \mathrm{High\ D}}$) and makes the results significant at the 99% confidence level. The rejection of the null hypotheses in an ANOVA analysis only indicates that one or more of the groups tested differs significantly from the others. Further post-hoc analysis has to be performed to determine which of the groups it is and whether the outlying group/s are greater or smaller than the others. In order to do this, the means and standard deviations were determined as shown in table 12.

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Table 12: Descriptive statistics over the decision spectrum in high dynamism industries

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Highly Causal	21	0.38	0.50	0.11	0.15	0.61	0	1
Moderately Causal	167	0.29	0.45	0.04	0.22	0.36	0	1
Neutral	521	0.26	0.44	0.02	0.23	0.30	0	1
Moderately Effectual	681	0.15	0.36	0.01	0.12	0.18	0	1
Highly Effectual	66	0.26	0.44	0.05	0.15	0.37	0	1

The table below (table 13) now compares the standard error of each of the groups with the difference in mean between the groups to establish which groups are statistically different as proven above.

Table 13: Inter group comparison of mean difference with standard error in high dynamism industries

	Std. Err	Mean	Highly Causal	Moderately Causal	Neutral	Moderately Effectual	Highly Effectual
Highly Causal	0.11	0.38	0	0.09	0.12	0.23	0.12
Moderately Causal	0.04	0.29	-0.09	0	0.03	0.14	0.03
Neutral	0.02	0.26	-0.12	-0.03	0	0.11	0
Moderately Effectual	0.01	0.15	-0.23	-0.14	-0.11	0	-0.11
Highly Effectual	0.05	0.26	-0.12	-0.03	0	0.11	0

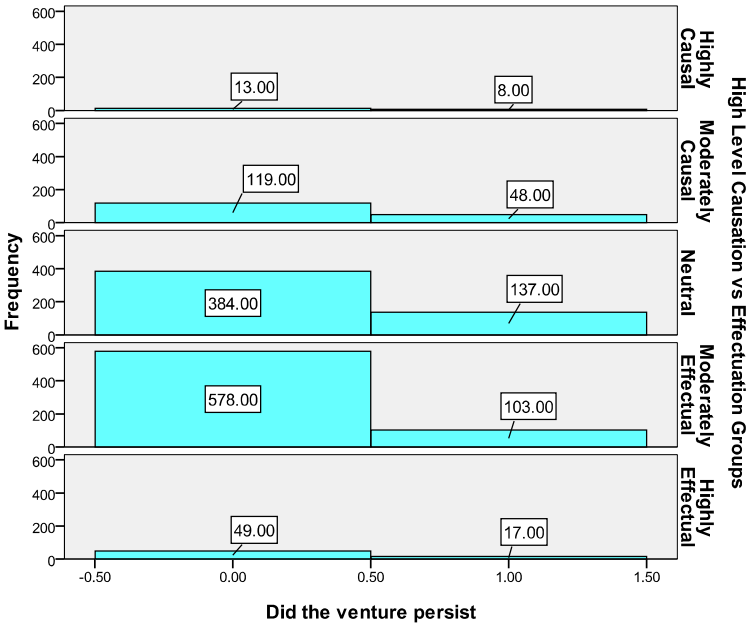
The differences highlighted in yellow are greater than the group standard error. The pattern above clearly distinguishes the highly causal and moderately effectual groups as having statistically higher and lower means respectively. The result on the hypotheses is that an entrepreneurs' decision logic has a statistically significant impact on the probability of his/her venture surviving.

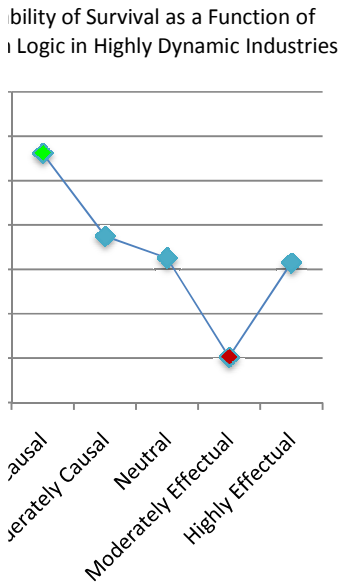
An entrepreneur following a highly causal decision logic in a highly dynamic industry has a 38% probability of survival which is more than double the probability of an entrepreneur following a moderately effectual decision logic (table 14 and figure 8).

Table 14: Probability of venture survival per decision logic group in high dynamism industries

	Discontinued Ventures	Persistent Ventures	Total	% Discontinued Ventures	% Persistent Ventures
Highly Causal	13	8	21	62%	38%
Moderately Causal	119	48	167	71%	29%
Neutral	384	137	521	74%	26%
Moderately Effectual	578	103	681	85%	15%
Highly Effectual	49	17	66	74%	26%

Figure 8: Discontinued and persistent ventures per decision logic group in high dynamism industries





5.5 Survival on a spectrum from Causation to Effectuation in Low Dynamism ($H_{0\ Low\ D}$ & $H_{A\ Low\ D}$)

In order to test the above hypotheses in low dynamism industries an ANOVA analysis was performed. The output from the analysis can be seen in table 15 below.

Table 15: ANOVA output for low dynamism industries

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.790	4	.698	3.979	.004
Within Groups	54.352	310	.175		
Total	57.143	314			

The F-value for $F(4,310) = 3.38, \alpha = 0.01 \ \therefore F = 3.979 > 3.38$ *disproves the null hypotheses* ($H_{0\ Low\ D}$) and makes the results significant at the 99% confidence level. In order to determine which of the groups are different the means and standard deviations were determined as shown in table 16.

Table 16: Descriptive statistics over the decision spectrum in low dynamism industries

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Highly Causal	10	0.20	0.42	0.13	-0.10	0.50	0	1
Moderately Causal	45	0.44	0.50	0.07	0.29	0.60	0	1
Neutral	115	0.23	0.42	0.04	0.15	0.30	0	1
Moderately Effectual	131	0.17	0.38	0.03	0.10	0.23	0	1
Highly Effectual	14	0.36	0.50	0.13	0.07	0.64	0	1

The table below (table 17) compares the standard error of each of the groups with the difference in mean between the groups to establish which groups are statistically different as proven above.

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Table 17: Inter group comparison of mean difference with standard error in low dynamism industries

	Std. Err	Mean	Highly Causal	Moderately Causal	Neutral	Moderately Effectual	Highly Effectual
Highly Causal	0.13	0.2	0	-0.24	-0.03	0.03	-0.16
Moderately Causal	0.07	0.44	0.24	0	0.21	0.27	0.08
Neutral	0.04	0.23	0.03	-0.21	0	0.06	-0.13
Moderately Effectual	0.03	0.17	-0.03	-0.27	-0.06	0	-0.19
Highly Effectual	0.13	0.36	0.16	-0.08	0.13	0.19	0

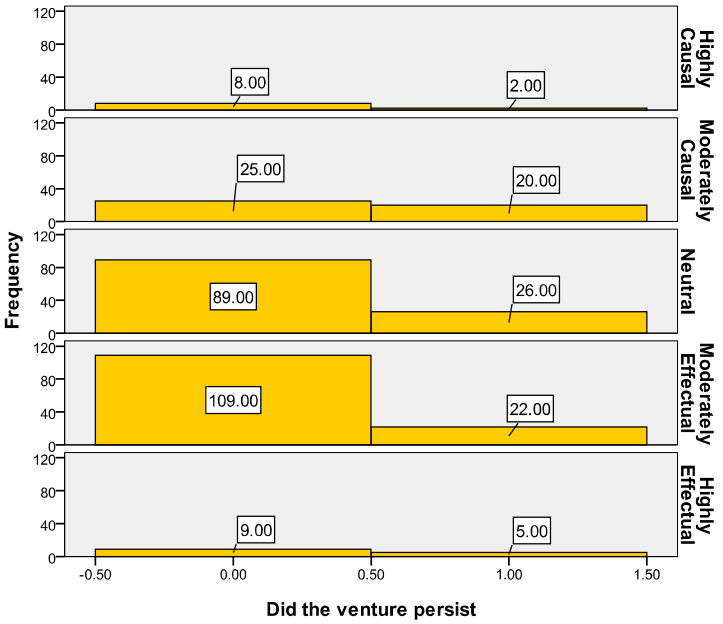
The pattern from this analysis is not nearly as clear as the pattern for highly dynamic industries which indicates a more varied result on survival as a function of decision logic. But, from the results above moderately causal and moderately effectual are the two groups with the largest deviations from the other groups with each having a statistically significant higher and lower mean respectively.

An entrepreneur following a moderately causal decision logic in a low dynamism industry has a 44% probability of survival which is significantly more than the 17% probability of an entrepreneur following a moderately effectual decision logic (table 18 and figure 9). A mention must be made of the 36% survival of highly effectual ventures in low dynamism industries compared to the 20% survival of highly causal ventures. This result is contrary to the view that causation is more applicable in low dynamism industries but can possibly be the result of the small sample size for highly effectual and highly causal ventures.

Table 18: Probability of venture survival per decision logic group in low dynamism industries

	Discontinued Ventures	Persistent Ventures	Total	% Discontinued Ventures	Persistent Ventures
Highly Causal	8	2	10	80%	20%
Moderately Causal	25	20	45	56%	44%
Neutral	89	26	115	77%	23%
Moderately Effectual	109	22	131	83%	17%
Highly Effectual	9	5	14	64%	36%

Figure 9: Discontinued and persistent ventures per decision logic group in low dynamism industries



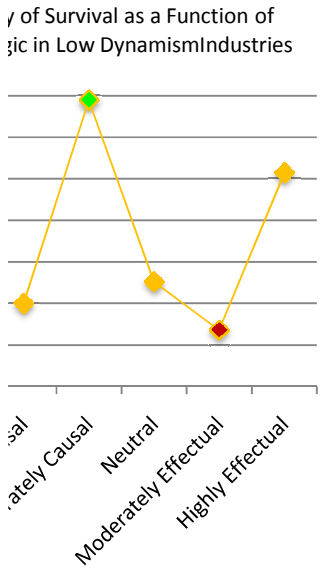
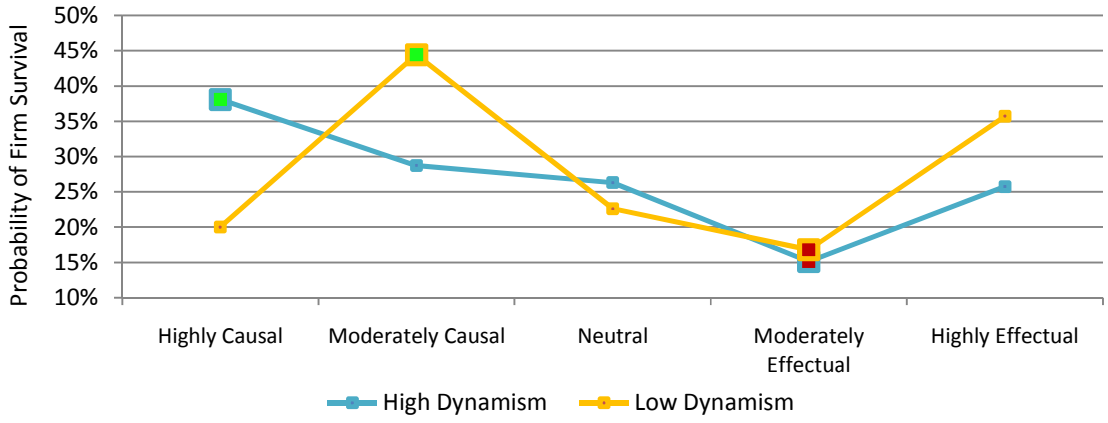


Figure 10 below summarises the mean probability of survival of the different groups for the high and low dynamism industries respectively. The mean values are taken from the probability of venture survival tables above but excludes the standard deviation of the approaches. It is evident from this view that the difference on the probability of survival per decision logic approach is extremely variable and significant.

Figure 10: Probability of survival over the causal/effectual spectrum in high and low dynamism industries



In order to determine the impact of the decision logic more precisely than could be achieved using the groups, the researcher compared the percentage surviving ventures per causal/effectual score (ranging from -7 to 7) in high and low dynamism industries. Below are graphs showing the percentage of firms persisting and being discontinued over the entire effectuation-causation spectrum in highly dynamic and low dynamism industries respectively.

Figure 11: % Discontinued and persistent ventures in highly dynamic industries

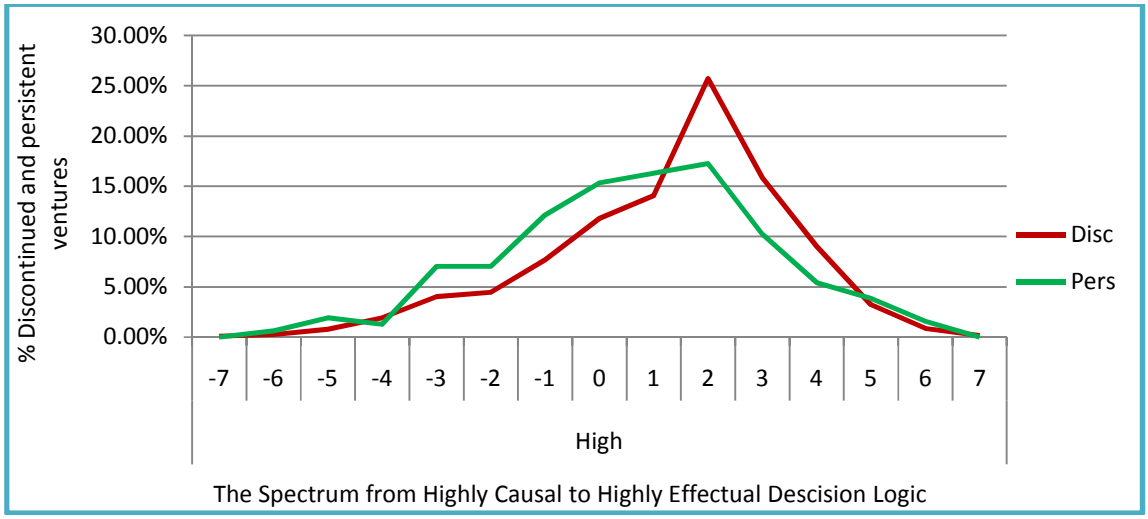
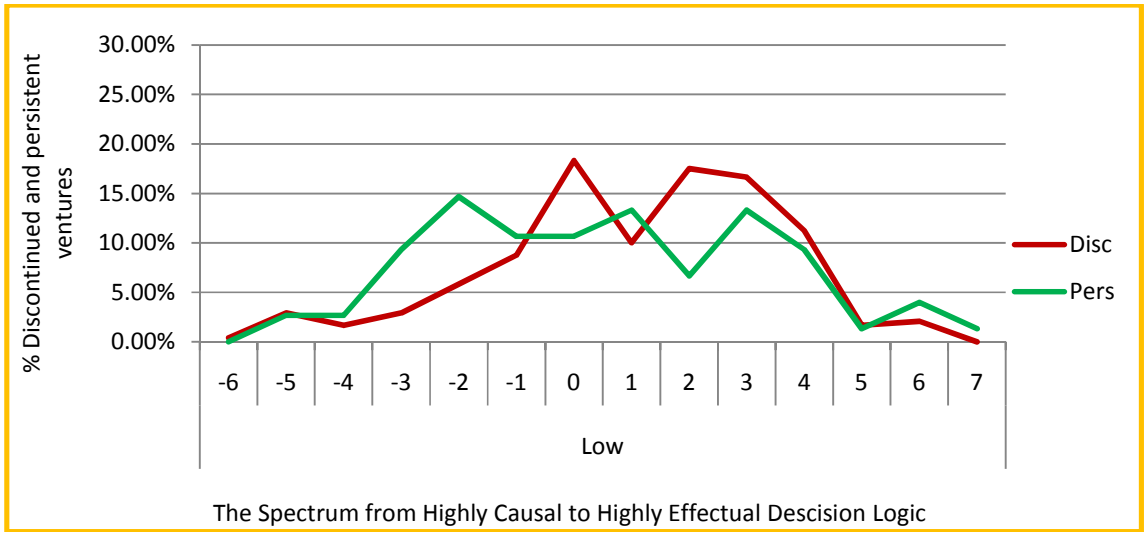


Figure 12: % Discontinued and persistent ventures in low dynamism industries



The difference between the percentage discontinued and percentage persistent ventures (% Pers - % Disc) will yield the net effect of the logic on the probability of survival.

Graphically, whenever the green (% persistent) line is above the red (% discontinued) line then the venture has a "survival premium" that is a function of the decision logic approach taken. Figure 13 below illustrates this percentage "survival premium" (when the green line trumps the red) or detriment (when the red line trumps the green) over the causal/effectual decision spectrum.

Figure 13: Net % survival premium (detriment) over the decision spectrum

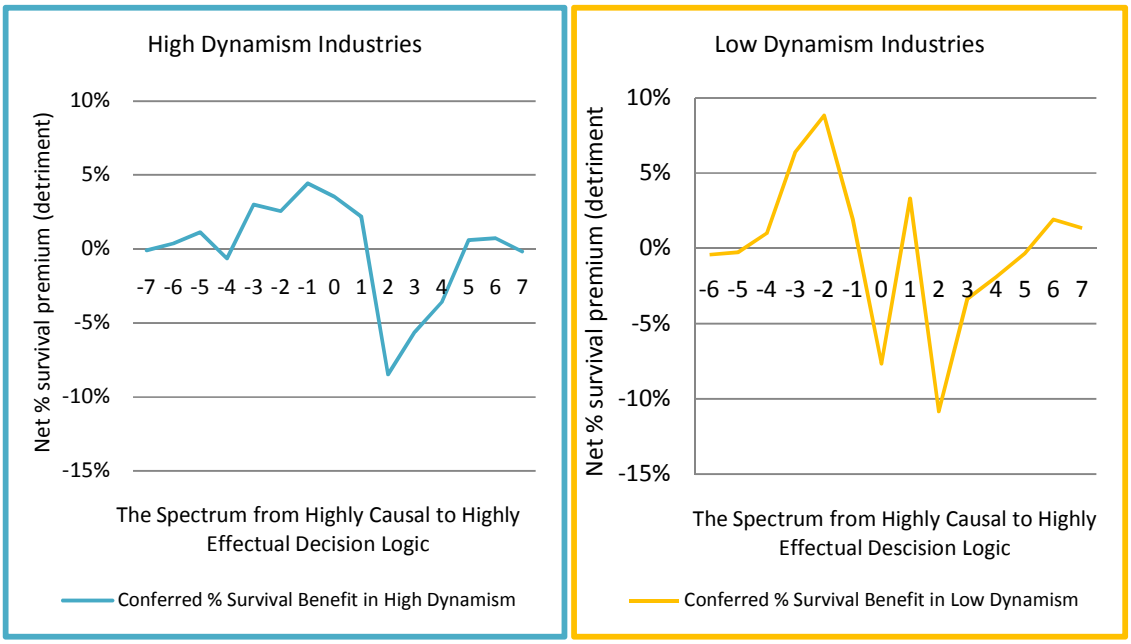
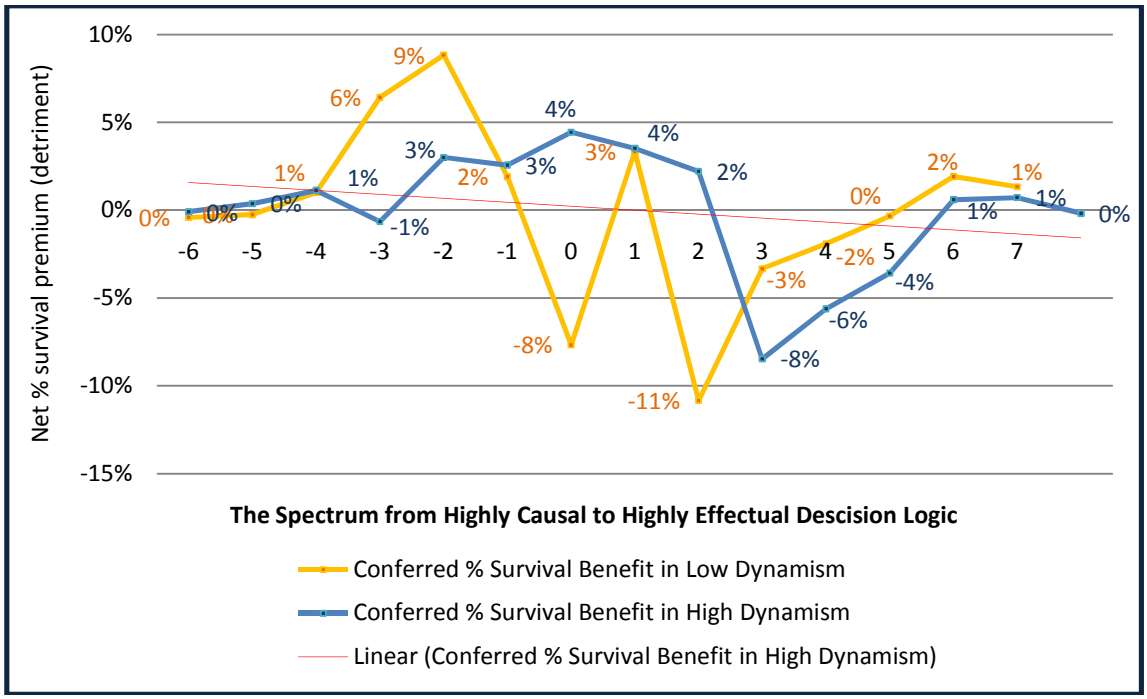


Figure 14: Net % survival premium (detriment) in high and low dynamism industries



From the above analysis it is clear that decision logic has a significant impact on entrepreneurial firm survival. In highly dynamic industries an entrepreneur with a neutral score has, on average, a 12% better probability of survival than an entrepreneur with an effectual score of "3" (moderately effectual). The effect is even more pronounced in low dynamism industries where an entrepreneur with a causal score of "-2" (moderately causal) has, on average, a 20% better probability of survival than an entrepreneur with an effectual score of "2" (moderately effectual). The application of a linear trend-line displays a small yet apparent association between increased effectual reasoning and decreased probability of survival in both high and low dynamism industries. The corresponding association between causal reasoning and an increased probability of survival (survival premium) is also evident. The researcher urges any entrepreneur to determine their decision logic using the questionnaire in appendix A and the dynamism of their industry in appendix B in order to determine the resulting survival premium or detriment from figure 14.

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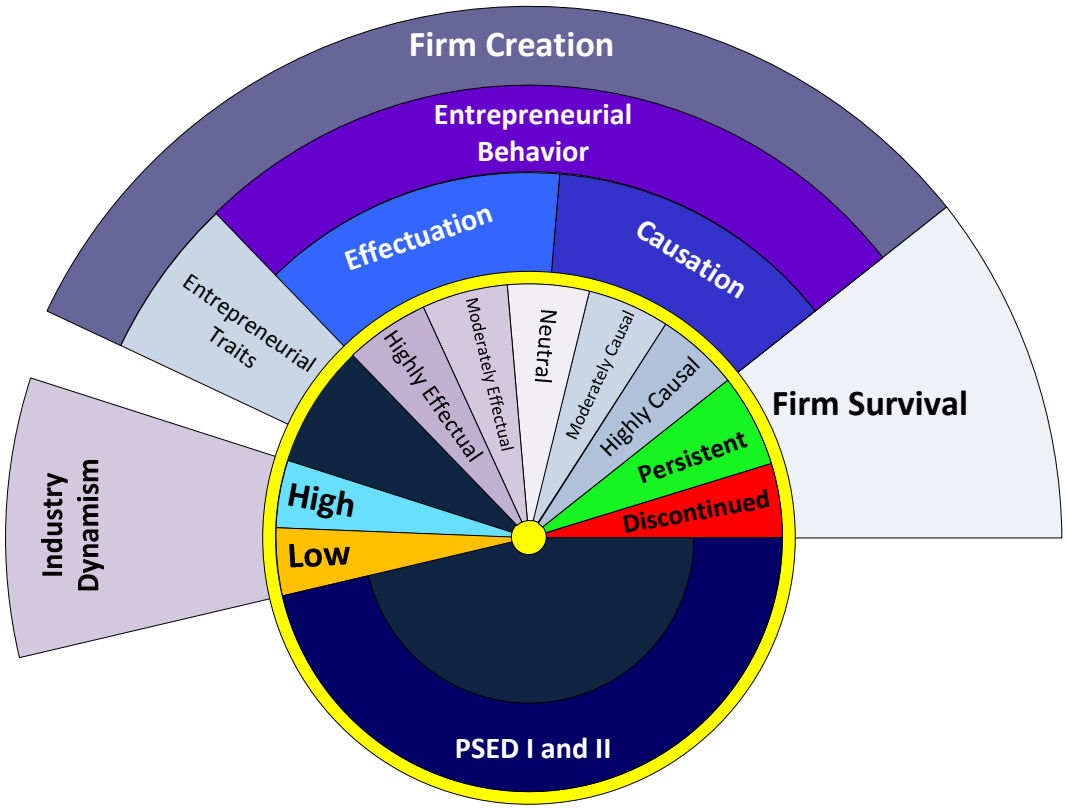
5.6 The Context of the Results in Literature

Figure 15 below describes the results determined above in terms of the literature context map set out in chapter one. The yellow circle in the diagram represents the intersection of the studies' three facets and includes the dataset required to perform the analysis. Each of the three facets will be discussed in turn starting with industry dynamism.

Figure 15: The results in the context of the literature



Industry Dynamism

The dynamism index, as built on, from the work by Hmielski and Baron (2009) was found to be consistent with the measure employed in their study of entrepreneurial optimism. However, the method employed in this study has a slightly better consistency and coupled with the ease of obtaining the data can be a very practical measure of industry level dynamism.

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Entrepreneurial Behaviour

In terms of the causation and effectuation constructs, the results from the study are consistent with the view that effectuation and causation can co-exist in a single venture if not in a single decision (Chandler, DeTienne, McKelvie, & Mumford, 2009; Sarasvathy & Venkataraman, 2000) as demonstrated by the distribution of decision logic across the spectrum from causal to effectual (figure.5). The most significant impact on the view above is made by the finding that "pure" causal and effectual logic is practically non-existent. The result is that not only *can* causation and effectuation co-exist but they *always* do.

The results of the study are also consistent with Sarasvathy's (2001) and Fisher's (2009) views that increased dynamism is more conducive to effectual reasoning (51% in high dynamism versus 46% in low dynamism). However, conflicting results were found between the positive effectuation/venture performance relationship determined by Read et al (2009) and the increased probability of firm failure with increased effectual reasoning established in this study. The finding that causal logic leads to, on average, a ten percent improved probability of survival is contrary to effectuation being the cause of improved venture performance. A possible explanation for this finding is that causation is better suited to nascent venture survival while effectuation is better suited to established business performance. Whether a causal nascent venture becomes effectual or whether the few effectual ventures that survive then thrive will require further study and are not addressed here.

Firm Survival

The average percentage surviving entrepreneurial ventures across all three dynamism categories was found to be 23.2% which is significantly lower than the 44% entrepreneurial survival determined by the Bureau of Labor Statistics. It is probable that the infant (nascent) nature of the ventures involved leads to the drastically lower survival rate.

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5.7 The Appropriateness of the Methodology and Data Collection

To avoid bias, any study into survival (in entrepreneurship or any other field) needs to be longitudinal and representative. In these dimensions the PSED is not only appropriate but ideal. However, in order to approximate the causal and effectual constructs, proxy variables in the PSED were identified. These variables were then used in lieu of dedicated questions on causation and effectuation. From this perspective the PSED is inappropriate. To improve the external validity of a future study in this vein the researcher proposes the inclusion of Chandler et al's (2009) questions into a PSED III initiative. The researcher believes the methodology used to test the data was appropriate and, accepting the limitations of the proxy variables, can be generalised.

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6. Conclusion

6.1 Introduction

The purpose of this study has been to determine whether a causal (the record company) or effectual (the garage band) approach to business formation is a predictive variable of firm survival. Because of the nature of the two approaches (respectively predicting and controlling the future) environmental dynamism was used as a moderating variable.

The relevance of the research was thoroughly established in chapter one with six accepted impacts of entrepreneurial survival, ranging from new market formation to labour productivity. To the researcher's knowledge this is the first empirical study testing for survival as a function of the effectuation construct. The results add to the growing body of research on the subjects of industry dynamism, effectuation and entrepreneurial survival. It also contributes to the discussion on whether effectuation is a better or worse alternative to causation.

However, this report is also written to be practically relevant to entrepreneurs. The context of the study in industry and academia is described to position the entrepreneur relative to the research. The practical distinctions between causation and effectuation are included to provide the entrepreneur with moments of introspection such as; "what was the opportunity that made me start my business?" And the questionnaire in appendix A and the industry lookup table in appendix B are included with the express motivation of allowing an entrepreneur to apply the findings from this paper to his/her business.

The researcher is of the opinion that, accepting the approximation of causation and effectuation above allows for the generalised application of the findings, as the weightings applied to the data ensure that it remains representative.

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6.2 "Pure" Causation versus "Pure" Effectuation

A significant finding is that there are practically *no pure causal or effectual ventures.* Only two ventures out of the total qualifying 1771 followed a "pure" effectuation approach, and no ventures followed a "pure" causal approach in either high or low dynamism industries. This finding disproves the null and alternative hypotheses for "pure" decision logic ($H_{0\,"Pure"}$ and $H_{A\,"Pure"}$) because not only is neither of the approaches a better predictor of survival, the number of entrepreneurs who follow "pure" causal or effectual logic is negligible.

6.3 The Causal Effectual Spectrum

Both the ANOVAs performed ($H_{0\,High\,D}$ and $H_{0\,Low\,D}$) disproved their respective null hypotheses. The resulting finding is that entrepreneurial survival is significantly dependant on the decision logic approach taken (highly causal to highly effectual) in both high and low dynamism industries. Further analysis established that regardless of industry dynamism a causal approach improves the probability of survival from 23% to 33% as opposed to an effectual approach. This result is even more pronounced if the entrepreneur doesn't follow a highly effectual approach with the probability of survival falling to 16%. The greatest differential between the two approaches can be seen in low dynamism industries where an entrepreneur has a 28% better chance of surviving if he/she follows a moderately causal as opposed to a moderately effectual approach. While the researcher does not believe this finding is the 'holy grail' of entrepreneurial research, he is still confident in stating that; accepting the approximation of causation and effectuation in this study, causation is a better approach for a nascent entrepreneurial venture to take.

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6.4 Checking the Results Against the Aims

The main aim of this research was to answer the question: if you are an entrepreneur, which approach should you take to increase the chances of your venture surviving? The answer is causation. Even though the amount of benefit varies with industry dynamism, causation on average gives an entrepreneur a 10% better chance of survival than effectuation.

In chapter one three secondary aims were stated, which if met in combination with the primary aim will qualify this research as successful.

The first was in assisting with the acceptance of Dew et al's *Behavioural Theory of the Entrepreneurial Firm* (BTF). If the BTF tenet that entrepreneurs should transform environments rather than act within extant ones can be loosely equated with an effectual decision logic approach, which the researcher believes it can, then it stands to reason that following a BTF approach leads to an increased probability of entrepreneurial firm failure. Once again, this statement is reliant on the approximation of effectuation achieved in this research.

The second aim was to answer the question: "Given a firm has limited resources and usually has several choices for investment, some of which are strategic and others that are effectual, how does it decide which investments to make?". The answer in the context of the findings above is that if given the choice, a nascent entrepreneurial firm should follow a strategic (causal) approach to increase its chances of survival.

And lastly: "what are the organization creation skills that an entrepreneur needs to know?" The answer to this question is that goal oriented organizational creation confers an improved probability of survival in both high and low dynamism industries.

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6.5 Research Limitations

This research sacrifices realism for pragmatism by excluding many mediating factors like industry type, number of employees, cultural influence, access to resources and the entrepreneur's learning preference among other things. It is this generalisation coupled with the uniqueness of every entrepreneurial enterprise that leads the researcher to caution against any direct thoughtless application of the findings herein. A second limitation is that even though a positive association was found between causal reasoning and firm survival, this research has not established why this would be the case or why the opposite is true for effectuation. A third limitation is that the research above does not distinguish between proxy variables any further than to classify them as causal or effectual. It is possible that the scoring process used to classify the cohort into the causal/effectual groups could hide a pattern in the proxy variables that is the "real" cause of the findings. And lastly, as a result of the nature of the PSED the findings are only representative of the US population. Further study will be required to test the results in other contexts such as developing markets.

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6.6 Potential Areas for Future Research

The researcher has identified four areas of possible future research. The first is to perform a dedicated longitudinal study testing for nascent entrepreneurial survival and using Chandler et al's (2009) variables to determine whether the entrepreneur is following a causal or an effectual approach. This would address the concern that the proxy variables used in this study approximates something other than causation and effectuation.

The second potential area of research is a study to determine which specific proxy variables used in this study have the greatest impact on the probability of a firm surviving. This could then be compared to the proxy variables making up each of the constructs in this study and so could validate or invalidate the findings above.

The third avenue of possible future research is to define industry dynamism on a more granular level (not just the ten high level industries defined in this study) and using the more granular industry dynamism index to test for entrepreneurial survival over the decision logic spectrum. The findings from this study could possibly explain the 18% difference in the probability for survival between high and low dynamism industries when applying highly causal decision logic.

The last proposal for further study more exploratory, experiential and informal; a researcher can employ a convenience sample by convincing a cohort of friends to start a band and notwithstanding the probability of survival being only 20% (average value of effectual survival in highly dynamic industries) a practical one sample experiment can substantiate or repudiate the findings above.

7. Appendices

7.1 Appendix A: Causal/Effectual Scoring Questionnaire

The questionnaire below is included to enable the entrepreneur reading this research paper to score his/her venture on the causal/effectual spectrum. If the answer to the questions in the first column are ANY of the bullets in the *causal* column then the venture scores a *minus one*. If the answer to the questions in the first column are ANY of the bullets in the *effectual* column then the venture scores a *plus one*, any answers not in the causal or effectual columns goes to *Not Applicable (N/A)* which scores a *zero*. In the case of a question having an answer in both the causal and effectual columns then use your discretion in determining which is more pertinent and score the question accordingly. At the end of the questionnaire, sum the scores for all the questions. The result is your companies' causal/effectual score.

Table 19: Causal/effectual scoring questionnaire

Questions (from PSED II)	Causal (-1)	Effectual (+1)	N/A (0)
What are the one or two main opportunities that prompted you to start this new business?	Have resources; Saved up to do it; Have cash backing; Have large investors; Have Loan or grant; Sold home, property or business; Can do better than the competition; Improve on current ways of doing things	Low overhead; Low cost property; have property; Low start-up costs; Good product; faith in product; like product; Expansion of old/current business; Opportunity to buy building, property or business;	New technology/product/service Good business idea Take advantage of opportunity High demand for products/business; satisfy need Market opportunity; untapped market; shift in market
What are the one or two main problems involved in starting this new business?	Start-up costs; Acquiring other capital/money; financing; Researching/acquiring information on competitors; Price competition; Market competition; Competition – NFS; Acquiring information on business plans; Developing a business plan; Forecasting future costs; Scheduling/time management; Accounting; Acquiring location; Acquiring supplies; Acquiring experience/education;	N/A	Any Other Problems

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Questions (from PSED II)	Causal (-1)	Effectual (+1)	N/A (0)
Did this new business emerge from your current work activity, from previous work activity, from a separate business you now own and manage, from a hobby or recreational pastime, from academic, scientific, or applied research, or was it from an idea you or another member of the start-up team had?	Idea from self or other member of start up team; Idea from family member (not part of start up team); Idea from other person (not part of start up team)	Current work activity; Previous work activity; Separate business now own and manage; Hobby or recreational past time	Any Other
What is the current form of your business plan is it unwritten or in your head, informally written, or formally prepared?	Formally prepared	Unwritten or Informally written	(must be one of the previous columns)
Has an effort been made to collect information about the competitors of this new business, will an effort be made to collect information about competitors in the future, or is this not relevant to the new business?	Yes, information has been collected about competitors	No, information has not yet been collected about competitors; I will in the future; No, not relevant	(must be one of the previous columns)
Has an effort been made to define the market opportunities for this new business, will an effort be made to define market opportunities, or is this not relevant for this new business?	Yes, market opportunities have been defined	No, market opportunities have not yet been defined; I will in the future; No, not relevant	(must be one of the previous columns)
Is the product or service that this new business will sell completely developed and ready for sale or delivery, has it been tested with customers as a prototype or procedure, is it being developed as a model or procedure, or is the product or service still in the idea stage?	Prototype/procedure has been tested with customers; Model/procedure is being developed; Still in the idea stage; no work done yet	Completed and ready for sale or delivery	(must be one of the previous columns)
I enjoy the uncertainty of going into a new situation without knowing what might happen.	Disagree Strongly disagree	Strongly agree Agree	Neutral
	TOTAL CAUSAL SCORE (-)	TOTAL EFFECTUAL SCORE (+)	TOTAL SCORE (/8)

7.2 Appendix B: Industry dynamism determination table

Below is a table providing the dynamism coding for each industry classified under NIACS. The use of this is to enable entrepreneurs to determine their industry dynamism and apply the learnings from this research to their work.

CD	Industry	Dyn
11	Agriculture, forestry, fishing, & hunting	Mod
11	Forestry and logging	Mod
11	Timber tract operations	Mod
11	Forest nurseries & gathering forest products	Mod
11	Logging	Mod
11	Fishing, hunting, & trapping	Mod
11	Fishing	Mod
11	Finfish fishing	Mod
11	Shellfish fishing	Mod
11	Other marine fishing	Mod
11	Hunting & trapping	Mod
11	Agriculture & forestry support activities	Mod
11	Crop production support activities	Mod
11	Cotton ginning	Mod
11	Soil preparation, planting, & cultivating	Mod
11	Crop harvesting, primarily by machine	Mod
11	Postharvest crop activities (exc. ginning)	Mod
11	Farm labor contractors & crew leaders	Mod
11	Farm management services	Mod
11	Animal production support activities	Mod
11	Forestry support activities	Mod
21	Mining	Mod
21	Oil & gas extraction	Mod
21	Crude petroleum & natural gas extraction	Mod
21	Natural gas liquid extraction	Mod
21	Mining (except oil & gas)	Mod
21	Coal mining	Mod
21	Bituminous coal & lignite surface mining	Mod
21	Bituminous coal underground mining	Mod
21	Anthracite mining	Mod
21	Metal ore mining	Mod
21	Iron ore mining	Mod
21	Gold ore & silver ore mining	Mod
21	Gold ore mining	Mod
21	Silver ore mining	Mod
21	Copper, nickel, lead, & zinc mining	Mod
21	Lead ore & zinc ore mining	Mod
21	Copper ore & nickel ore mining	Mod
21	Other metal ore mining	Mod
21	Uraniumradiumvanadium ore mining	Mod
21	All other metal ore mining	Mod
21	Nonmetallic mineral mining & quarrying	Mod
21	Stone mining & quarrying	Mod
21	Dimension stone mining & quarrying	Mod
21	Crushed & broken limestone mining & quarrying	Mod
21	Crushed & broken granite mining & quarrying	Mod
21	Other crushed & broken stone mining & quarrying	Mod
21	Sand, gravel, clay, ceramic & refractory minerals mng & quarrying	Mod
21	Construction sand & gravel mining	Mod
21	Industrial sand mining	Mod
21	Kaolin & ball clay mining	Mod
21	Clay & ceramic & refractory minerals mining	Mod
21	Other nonmetallic mineral mining & quarrying	Mod
21	Potash, soda, & borate mineral mining	Mod
21	Phosphate rock mining	Mod
21	Other chemical & fertilizer mineral mining	Mod
21	All other nonmetallic mineral mining	Mod
21	Support activities for mining	Mod
21	Drilling oil & gas wells	Mod
21	Support activities for oil & gas operations	Mod
21	Support activities for coal mining	Mod
21	Support activities for metal mining	Mod
21	Support activities for nonmetallic minerals (except fuels)	Mod
22	Utilities	Low
22	Electric power generation, transmission, & distribution	Low
22	Electric power generation	Low
22	Hydroelectric power generation	Low
22	Fossil fuel electric power generation	Low
22	Nuclear electric power generation	Low
22	Other electric power generation	Low
22	Electric power transmission, control, & distribution	Low
22	Electric bulk power transmission & control	Low
22	Electric power distribution	Low
22	Natural gas distribution	Low
22	Water, sewage, & other systems	Low
22	Water supply & irrigation systems	Low
22	Sewage treatment facilities	Low
22	Steam & airconditioning supply	Low
23	Construction	Mod
23	Building, developing, & general contracting	Mod
23	Land subdivision & land development	Mod
23	Residential building construction	Mod
23	Singlefamily housing construction	Mod
23	Multifamily housing construction	Mod
23	Nonresidential building construction	Mod
23	Mfg & industrial building construction	Mod
23	Commercial & institutional building construction	Mod
23	Heavy construction	Mod
23	Highway, street, bridge, & tunnel construction	Mod
23	Highway & street construction	Mod
23	Bridge & tunnel construction	Mod
23	Other heavy construction	Mod
23	Water, sewer, & pipeline construction	Mod
23	Power & communication transmission line construction	Mod
23	Industrial nonbuilding structure construction	Mod
23	All other heavy construction	Mod
23	Special trade contractors	Mod
23	Plumbing, heating, & airconditioning contractors	Mod
23	Painting & wall covering contractors	Mod
23	Electrical contractors	Mod
23	Masonry, drywall, insulation, & tile contractors	Mod
23	Masonry & stone contractors	Mod
23	Drywall, plastering, acoustical, & insulation contractors	Mod
23	Tile, marble, terrazzo, & mosaic contractors	Mod
23	Carpentry & floor contractors	Mod
23	Carpentry contractors	Mod
23	Floor laying & other floor contractors	Mod
23	Roofing, siding, & sheet metal contractors	Mod
23	Concrete contractors	Mod
23	Water well drilling contractors	Mod
23	Other special trade contractors	Mod
23	Structural steel erection contractors	Mod
23	Glass & glazing contractors	Mod
23	Excavation contractors	Mod
23	Wrecking & demolition contractors	Mod
23	Building equip & other machinery installation contractors	Mod
23	All other special trade contractors	Mod
31	Manufacturing	High
31	Food mfg	High
31	Animal food mfg	High
31	Dog & cat food mfg	High
31	Other animal food mfg	High
31	Grain & oilseed milling	High
31	Flour milling & malt mfg	High
31	Flour milling	High
31	Rice milling	High
31	Malt mfg	High
31	Starch & vegetable fats & oils mfg	High
31	Wet corn milling	High
31	Soybean processing	High
31	Other oilseed processing	High
31	Fats & oils refining & blending	High
31	Breakfast cereal mfg	High
31	Sugar & confectionery product mfg	High
31	Sugar mfg	High
31	Sugarcane mills	High
31	Cane sugar refining	High
31	Beet sugar mfg	High
31	Chocolate & confectionery mfg from cacao beans	High
31	Confectionery mfg from purchased chocolate	High
31	Nonchocolate confectionery mfg	High
31	Fruit & vegetable preserving & specialty food mfg	High
31	Frozen food mfg	High
31	Frozen fruit, juice, & vegetable mfg	High
31	Frozen specialty food mfg	High
31	Fruit & vegetable canning, pickling, & drying	High
31	Fruit & vegetable canning	High
31	Specialty canning	High
31	Dried & dehydrated food mfg	High
31	Dairy product mfg	High
31	Dairy product (except frozen) mfg	High
31	Fluid milk mfg	High
31	Creamery butter mfg	High
31	Cheese mfg	High
31	Dry, condensed, & evaporated dairy product mfg	High
31	Ice cream & frozen dessert mfg	High
31	Meat product mfg	High
31	Animal slaughtering & processing	High
31	Animal (except poultry) slaughtering	High
31	Meat processed from carcasses	High
31	Rendering & meat byproduct processing	High
31	Poultry processing	High
31	Seafood product preparation & packaging	High
31	Seafood canning	High
31	Fresh & frozen seafood processing	High

31	Bakeries & tortilla mfg	High
31	Bread & bakery product mfg	High
31	Retail bakeries	High
31	Commercial bakeries	High
31	Frozen cakes, pies, & other pastries mfg	High
31	Cookie, cracker, & pasta mfg	High
31	Cookie & cracker mfg	High
31	Flour mixes & dough mfg from purchased flour	High
31	Dry pasta mfg	High
31	Tortilla mfg	High
31	Other food mfg	High
31	Snack food mfg	High
31	Roasted nuts & peanut butter mfg	High
31	Other snack food mfg	High
31	Coffee & tea mfg	High
31	Flavoring syrup & concentrate mfg	High
31	Seasoning & dressing mfg	High
31	Mayonnaise, dressing, & other prepared sauce mfg	High
31	Spice & extract mfg	High
31	All other food mfg	High
31	Perishable prepared food mfg	High
31	All other miscellaneous food mfg	High
31	Beverage & tobacco product mfg	High
31	Beverage mfg	High
31	Soft drink & ice mfg	High
31	Soft drink mfg	High
31	Bottled water mfg	High
31	Ice mfg	High
31	Breweries	High
31	Wineries	High
31	Distilleries	High
31	Tobacco mfg	High
31	Tobacco stemming & redrying	High
31	Tobacco product mfg	High
31	Cigarette mfg	High
31	Other tobacco product mfg	High
31	Textile mills	High
31	Fiber, yarn, & thread mills	High
31	Yarn spinning mills	High
31	Yarn texturing, throwing, & twisting mills	High
31	Thread mills	High
31	Fabric mills	High
31	Broadwoven fabric mills	High
31	Narrow fabric mills & schiffli machine embroidery	High
31	Narrow fabric mills	High
31	Schiffli machine embroidery	High
31	Nonwoven fabric mills	High
31	Knit fabric mills	High
31	Weft knit fabric mills	High
31	Other knit fabric & lace mills	High
31	Textile & fabric finishing & fabric coating mills	High
31	Textile & fabric finishing mills	High
31	Broadwoven fabric finishing mills	High
31	Fabric coating mills	High
31	Textile product mills	High
31	Textile furnishings mills	High
31	Carpet & rug mills	High
31	Curtain & linen mills	High
31	Curtain & drapery mills	High
31	Other household textile product mills	High
31	Other textile product mills	High
31	Textile bag & canvas mills	High
31	Textile bag mills	High
31	Canvas & related product mills	High
31	All other textile product mills	High
31	Rope, cordage, & twine mills	High
31	Tire cord & tire fabric mills	High
31	All other miscellaneous textile product mills	High
31	Apparel mfg	High
31	Apparel knitting mills	High
31	Hosiery & sock mills	High
31	Sheer hosiery mills	High
31	Other hosiery & sock mills	High
31	Other apparel knitting mills	High
31	Outerwear knitting mills	High
31	Underwear & nightwear knitting mills	High
31	Cut & sew apparel mfg	High
31	Cut & sew apparel contractors	High
31	Men's & boys' cut & sew apparel contractors	High
31	Women's, girls', & infants' cut & sew apparel contractors	High
31	Men's & boys' cut & sew apparel mfg	High
31	Men's & boys' cut & sew underwear & nightwear mfg	High
31	Men's & boys' cut & sew suit, coat, & overcoat mfg	High
31	Men's & boys' cut & sew shirt (exc. work shirt) mfg	High
31	Men's & boys' cut & sew trouser, slack, & jean mfg	High
31	Men's & boys' cut & sew work clothing mfg	High
31	Men's & boys' cut & sew other outerwear mfg	High
31	Women's & girls' cut & sew apparel mfg	High
31	Women's & girls' cut/sew lingerie & nightwear mfg	High
31	Women's & girls' cut & sew blouse & shirt mfg	High
31	Women's & girls' cut & sew dress mfg	High
31	Women's & girls' cut & sew suit, coat, skirt mfg	High
31	Women's & girls' cut & sew other outerwear mfg	High
31	Other cut & sew apparel mfg	High
31	Infants' cut & sew apparel mfg	High
31	Fur & leather apparel mfg	High
31	All other cut & sew apparel mfg	High
31	Apparel accessories & other apparel mfg	High
31	Hat, cap, & millinery mfg	High
31	Glove & mitten mfg	High
31	Men's & boys' neckwear mfg	High
31	Other apparel accessories & other apparel mfg	High
31	Leather & allied product mfg	High
31	Leather & hide tanning & finishing	High
31	Footwear mfg	High
31	Rubber & plastics footwear mfg	High
31	House slipper mfg	High
31	Men's footwear (except athletic) mfg	High
31	Women's footwear (except athletic) mfg	High
31	Other footwear mfg	High
31	Other leather & allied product mfg	High
31	Luggage mfg	High
31	Women's handbag & purse mfg	High
31	Personal leather good (except women's handbag & purse) mfg	High
31	All other leather good mfg	High
32	Wood product mfg	High
32	Sawmills & wood preservation	High
32	Sawmills	High
32	Wood preservation	High
32	Veneer, plywood, & engineered wood product mfg	High
32	Hardwood veneer & plywood mfg	High
32	Softwood veneer & plywood mfg	High
32	Engineered wood member (except truss) mfg	High
32	Truss mfg	High
32	Reconstituted wood product mfg	High
32	Other wood product mfg	High
32	Millwork	High
32	Wood window & door mfg	High
32	Cut stock, resawing lumber, & planing	High
32	Other millwork (including flooring)	High
32	Wood container & pallet mfg	High
32	All other wood product mfg	High
32	Manufactured home (mobile home) mfg	High
32	Prefabricated wood building mfg	High
32	All other miscellaneous wood product mfg	High
32	Paper mfg	High
32	Pulp, paper, & paperboard mills	High
32	Pulp mills	High
32	Paper mills	High
32	Paper (except newsprint) mills	High
32	Newsprint mills	High
32	Paperboard mills	High
32	Converted paper product mfg	High
32	Paperboard container mfg	High
32	Corrugated & solid fiber box mfg	High
32	Folding paperboard box mfg	High
32	Setup paperboard box mfg	High
32	Fiber can, tube, drum, & similar products mfg	High
32	Nonfolding sanitary food container mfg	High
32	Paper bag & coated & treated paper mfg	High
32	Coated & laminated packaging paper & plastics film mfg	High
32	Coated & laminated paper mfg	High
32	Plastics, foil, & coated paper bag mfg	High
32	Uncoated paper & multiwall bag mfg	High
32	Laminated aluminum foil mfg for flexible packaging uses	High
32	Surfacecoated paperboard mfg	High
32	Stationery product mfg	High
32	Diecut paper & paperboard office supplies mfg	High
32	Envelope mfg	High
32	Stationery, tablet, & related product mfg	High
32	Other converted paper product mfg	High
32	Sanitary paper product mfg	High
32	All other converted paper product mfg	High
32	Printing & related support activities	High
32	Printing	High
32	Commercial lithographic printing	High
32	Commercial gravure printing	High
32	Commercial flexographic printing	High
32	Commercial screen printing	High
32	Quick printing	High
32	Digital printing	High
32	Manifold business form printing	High
32	Book printing	High
32	Blankbook, looseleaf binder, & device mfg	High
32	Other commercial printing	High
32	Support activities for printing	High
32	Tradebinding & related work	High
32	Prepress services	High
32	Petroleum & coal products mfg	High
32	Petroleum refineries	High
32	Asphalt paving, roofing, & saturated materials mfg	High
32	Asphalt paving mixture & block mfg	High
32	Asphalt shingle & coating materials mfg	High
32	Other petroleum & coal products mfg	High
32	Petroleum lubricating oil & grease mfg	High
32	All other petroleum & coal products mfg	High
32	Chemical mfg	High
32	Basic chemical mfg	High
32	Petrochemical mfg	High
32	Industrial gas mfg	High
32	Dye & pigment mfg	High
32	Inorganic dye & pigment mfg	High
32	Synthetic organic dye & pigment mfg	High
32	Other basic inorganic chemical mfg	High
32	Alkalies & chlorine mfg	High
32	Carbon black mfg	High
32	All other basic inorganic chemical mfg	High
32	Other basic organic chemical mfg	High
32	Gum & wood chemical mfg	High
32	Cyclic crude & intermediate mfg	High

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32	Ethyl alcohol mfg	High
32	All other basic organic chemical mfg	High
32	Resin, syn rubber, & artificial & syn fibers & filaments mfg	High
32	Resin & synthetic rubber mfg	High
32	Plastics material & resin mfg	High
32	Synthetic rubber mfg	High
32	Artificial & synthetic fibers & filaments mfg	High
32	Cellulosic organic fiber mfg	High
32	Noncellulosic organic fiber mfg	High
32	Pesticide, fertilizer, & other agricultural chemical mfg	High
32	Fertilizer mfg	High
32	Nitrogenous fertilizer mfg	High
32	Phosphatic fertilizer mfg	High
32	Fertilizer (mixing only) mfg	High
32	Pesticide & other agricultural chemical mfg	High
32	Pharmaceutical & medicine mfg	High
32	Medicinal & botanical mfg	High
32	Pharmaceutical preparation mfg	High
32	Invitro diagnostic substance mfg	High
32	Biological product (except diagnostic) mfg	High
32	Paint, coating, & adhesive mfg	High
32	Paint & coating mfg	High
32	Adhesive mfg	High
32	Soap, cleaning compound, & toilet preparation mfg	High
32	Soap & cleaning compound mfg	High
32	Soap & other detergent mfg	High
32	Polish & other sanitation good mfg	High
32	Surface active agent mfg	High
32	Toilet preparation mfg	High
32	Other chemical product mfg	High
32	Printing ink mfg	High
32	Explosives mfg	High
32	All other chemical product & preparation mfg	High
32	Custom compounding of purchased resin	High
32	Photographic film, paper, plate, & chemical mfg	High
32	All other miscellaneous chemical product & preparation mfg	High
32	Plastics & rubber products mfg	High
32	Plastics product mfg	High
32	Unsupported plastics film, sheet, & bag mfg	High
32	Unsupported plastics bag mfg	High
32	Unsupported plastics packaging film & sheet mfg	High
32	Unsupported plastics film & sheet (except packaging) mfg	High
32	Plastics pipe, pipe fitting, & unsupported profile shape mfg	High
32	Unsupported plastics profile shape mfg	High
32	Plastics pipe & pipe fitting mfg	High
32	Laminated plastics plate, sheet, & shape mfg	High
32	Polystyrene foam product mfg	High
32	Urethane & other foam product (except polystyrene) mfg	High
32	Plastics bottle mfg	High
32	Other plastics product mfg	High
32	Plastics plumbing fixture mfg	High
32	Resilient floor covering mfg	High
32	All other plastics product mfg	High
32	Rubber product mfg	High
32	Tire mfg	High
32	Tire mfg (except retreading)	High
32	Tire retreading	High
32	Rubber & plastics hoses & belting mfg	High
32	Other rubber product mfg	High
32	Rubber product mfg for mechanical use	High
32	All other rubber product mfg	High
32	Nonmetallic mineral product mfg	High
32	Clay product & refractory mfg	High
32	Pottery, ceramics, & plumbing fixture mfg	High
32	Vitreous china plumbing fixture & bathroom accessories mfg	High
32	Vitreous china, fine earthenware, & other pottery product mfg	High
32	Porcelain electrical supply mfg	High
32	Clay building material & refractories mfg	High
32	Brick & structural clay tile mfg	High
32	Ceramic wall & floor tile mfg	High
32	Other structural clay product mfg	High
32	Clay refractory mfg	High
32	Nonclay refractory mfg	High
32	Glass & glass product mfg	High
32	Flat glass mfg	High
32	Other pressed & blown glass & glassware mfg	High
32	Glass container mfg	High
32	Glass product mfg made of purchased glass	High
32	Cement & concrete product mfg	High
32	Cement mfg	High
32	Readymix concrete mfg	High
32	Concrete pipe, brick, & block mfg	High
32	Concrete block & brick mfg	High
32	Concrete pipe mfg	High
32	Other concrete product mfg	High
32	Lime & gypsum product mfg	High
32	Lime mfg	High
32	Gypsum product mfg	High
32	Other nonmetallic mineral product mfg	High
32	Abrasive product mfg	High
32	All other nonmetallic mineral product mfg	High
32	Cut stone & stone product mfg	High
32	Ground or treated mineral & earth mfg	High
32	Mineral wool mfg	High
32	All other miscellaneous nonmetallic mineral product mfg	High
33	Primary metal mfg	High
33	Iron & steel mills & ferroalloy mfg	High
33	Iron & steel mills	High
33	Electrometallurgical ferroalloy product mfg	High
33	Steel product mfg from purchased steel	High
33	Iron & steel pipes & tubes mfg from purchased steel	High
33	Rolling & drawing of purchased steel	High
33	Coldrolled steel shape mfg	High
33	Steel wire drawing	High
33	Alumina & aluminum production & processing	High
33	Alumina refining	High
33	Primary aluminum production	High
33	Secondary smelting & alloying of aluminum	High
33	Aluminum sheet, plate, & foil mfg	High
33	Aluminum extruded product mfg	High
33	Other aluminum rolling & drawing	High
33	Nonferrous metal (except aluminum) production & processing	High
33	Nonferrous metal (except aluminum) smelting & refining	High
33	Primary smelting & refining of copper	High
33	Other nonferrous metal primary smelting & refining	High
33	Copper rolling, drawing, extruding, & alloying	High
33	Copper rolling, drawing, & extruding	High
33	Copper wire (except mechanical) drawing	High
33	Secondary smelting, refining, & alloying of copper	High
33	Other nonferrous metal rolling, drawing, extruding, & alloying	High
33	Other nonferrous metal rolling, drawing, & extruding	High
33	Other nonferrous metal secondary smelting, refining, & alloying	High
33	Foundries	High
33	Ferrous metal foundries	High
33	Iron foundries	High
33	Steel investment foundries	High
33	Steel foundries (except investment)	High
33	Nonferrous metal foundries	High
33	Aluminum diecasting foundries	High
33	Nonferrous (except aluminum) diecasting foundries	High
33	Aluminum foundries (except diecasting)	High
33	Copper foundries (except diecasting)	High
33	Other nonferrous foundries (except diecasting)	High
33	Fabricated metal product mfg	High
33	Forging & stamping	High
33	Iron & steel forging	High
33	Nonferrous forging	High
33	Custom roll forming	High
33	Crown & closure mfg	High
33	Metal stamping	High
33	Powder metallurgy part mfg	High
33	Cutlery & handtool mfg	High
33	Cutlery & flatware (except precious) mfg	High
33	Hand & edge tool mfg	High
33	Saw blade & handsaw mfg	High
33	Kitchen utensil, pot, & pan mfg	High
33	Architectural & structural metals mfg	High
33	Plate work & fabricated structural product mfg	High
33	Prefabricated metal building & component mfg	High
33	Fabricated structural metal mfg	High
33	Plate work mfg	High
33	Ornamental & architectural metal products mfg	High
33	Metal window & door mfg	High
33	Sheet metal work mfg	High
33	Ornamental & architectural metal work mfg	High
33	Boiler, tank, & shipping container mfg	High
33	Power boiler & heat exchanger mfg	High
33	Metal tank (heavy gauge) mfg	High
33	Metal can, box, & other metal container (light gauge) mfg	High
33	Metal can mfg	High
33	Other metal container mfg	High
33	Hardware mfg	High
33	Spring & wire product mfg	High
33	Spring (heavy gauge) mfg	High
33	Spring (light gauge) mfg	High
33	Other fabricated wire product mfg	High
33	Machine shops, turned product, & screw, nut, & bolt mfg	High
33	Machine shops	High
33	Turned product & screw, nut, & bolt mfg	High
33	Precision turned product mfg	High
33	Bolt, nut, screw, rivet, & washer mfg	High
33	Coating, engraving, heat treating, & allied activities	High
33	Metal heat treating	High
33	Metal coating/engraving (exc. jewelry/silverware)/allied services	High
33	Electroplating, plating, polishing, anodizing, & coloring	High
33	Other fabricated metal product mfg	High
33	Metal valve mfg	High
33	Industrial valve mfg	High
33	Fluid power valve & hose fitting mfg	High
33	Plumbing fixture fitting & trim mfg	High
33	Other metal valve & pipe fitting mfg	High
33	All other fabricated metal product mfg	High
33	Ball & roller bearing mfg	High
33	Small arms ammunition mfg	High
33	Ammunition (except small arms)	High

	mfg	
33	Small arms mfg	High
33	Other ordnance & accessories mfg	High
33	Fabricated pipe & pipe fitting mfg	High
33	Industrial pattern mfg	High
33	Enameled iron & metal sanitary ware mfg	High
33	All other miscellaneous fabricated metal product mfg	High
33	Machinery mfg	High
33	Agriculture, construction, & mining machinery mfg	High
33	Agricultural implement mfg	High
33	Farm machinery & equipment mfg	High
33	Lawn & garden tractor & home lawn & garden equipment mfg	High
33	Construction machinery mfg	High
33	Mining & oil & gas field machinery mfg	High
33	Mining machinery & equipment mfg	High
33	Oil & gas field machinery & equipment mfg	High
33	Industrial machinery mfg	High
33	Sawmill & woodworking machinery mfg	High
33	Plastics & rubber industry machinery mfg	High
33	Other industrial machinery mfg	High
33	Paper industry machinery mfg	High
33	Textile machinery mfg	High
33	Printing machinery & equipment mfg	High
33	Food product machinery mfg	High
33	Semiconductor machinery mfg	High
33	All other industrial machinery mfg	High
33	Commercial & service industry machinery mfg	High
33	Automatic vending machine mfg	High
33	Commercial laundry, drycleaning, & pressing machine mfg	High
33	Office machinery mfg	High
33	Optical instrument & lens mfg	High
33	Photographic & photocopying equipment mfg	High
33	Other commercial & service industry machinery mfg	High
33	Ventilation, heating, AC, & commercial refrigeration equip mfg	High
33	Air purification equipment mfg	High
33	Industrial & commercial fan & blower mfg	High
33	Heating equipment (except warm air furnaces) mfg	High
33	AC & warm air heating & commercial/industrial refrig equip mfg	High
33	Metalworking machinery mfg	High
33	Industrial mold mfg	High
33	Machine tool (metal cutting types) mfg	High
33	Machine tool (metal forming types) mfg	High
33	Special die & tool, die set, jig, & fixture mfg	High
33	Cutting tool & machine tool accessory mfg	High
33	Rolling mill machinery & equipment mfg	High
33	Other metalworking machinery mfg	High
33	Engine, turbine, & power transmission equipment mfg	High
33	Turbine & turbine generator set unit mfg	High
33	Speed changer, industrial highspeed drive, & gear mfg	High
33	Mechanical power transmission equipment mfg	High
33	Other engine equipment mfg	High
33	Other generalpurpose machinery mfg	High
33	Pump & compressor mfg	High
33	Pump & pumping equipment mfg	High
33	Air & gas compressor mfg	High
33	Measuring & dispensing pump mfg	High
33	Material handling equipment mfg	High
33	Elevator & moving stairway mfg	High
33	Conveyor & conveying equipment mfg	High
33	Overhead traveling crane, hoist, & monorail system mfg	High
33	Industrial truck, tractor, trailer, & stacker machinery mfg	High
33	All other generalpurpose machinery mfg	High
33	Powerdriven handtool mfg	High
33	Welding & soldering equipment mfg	High
33	Packaging machinery mfg	High
33	Industrial process furnace & oven mfg	High
33	Fluid power cylinder & actuator mfg	High
33	Fluid power pump & motor mfg	High
33	Scale & balance (except laboratory) mfg	High
33	All other miscellaneous generalpurpose machinery mfg	High
33	Computer & electronic product mfg	High
33	Computer & peripheral equipment mfg	High
33	Electronic computer mfg	High
33	Computer storage device mfg	High
33	Computer terminal mfg	High
33	Other computer peripheral equipment mfg	High
33	Communications equipment mfg	High
33	Telephone apparatus mfg	High
33	Radio & TV broadcasting & wireless communications equipment mfg	High
33	Other communications equipment mfg	High
33	Audio & video equipment mfg	High
33	Semiconductor & other electronic component mfg	High
33	Electron tube mfg	High
33	Bare printed circuit board mfg	High
33	Semiconductor & related device mfg	High
33	Electronic capacitor mfg	High
33	Electronic resistor mfg	High
33	Electronic coil, transformer, & other inductor mfg	High
33	Electronic connector mfg	High
33	Printed circuit assembly (electronic assembly) mfg	High
33	Other electronic component mfg	High
33	Navigational, measuring, medical, & control instruments mfg	High
33	Electromedical & electrotherapeutic apparatus mfg	High
33	Search, detection, navigation, & guidance instrument mfg	High
33	Automatic environmental control mfg	High
33	Industrial process control instrument mfg	High
33	Totalizing fluid meter & counting device mfg	High
33	Electricity measuring & testing instrument mfg	High
33	Analytical laboratory instrument mfg	High
33	Irradiation apparatus mfg	High
33	Watch, clock, & part mfg	High
33	Other measuring & controlling device mfg	High
33	Mfg & reproducing magnetic & optical media	High
33	Software reproducing	High
33	Prerecorded CD (except software), tape, & record reproducing	High
33	Magnetic & optical recording media mfg	High
33	Electrical equipment, appliance, & component mfg	High
33	Electric lighting equipment mfg	High
33	Electric lamp bulb & part mfg	High
33	Lighting fixture mfg	High
33	Residential electric lighting fixture mfg	High
33	Commercial/industrial/institutional electric lighting fixture mfg	High
33	Other lighting equipment mfg	High
33	Household appliance mfg	High
33	Small electrical appliance mfg	High
33	Electric housewares & household fan mfg	High
33	Household vacuum cleaner mfg	High
33	Major appliance mfg	High
33	Household cooking appliance mfg	High
33	Household refrigerator & home freezer mfg	High
33	Household laundry equipment mfg	High
33	Other major household appliance mfg	High
33	Electrical equipment mfg	High
33	Power, distribution, & specialty transformer mfg	High
33	Motor & generator mfg	High
33	Switchgear & switchboard apparatus mfg	High
33	Relay & industrial control mfg	High
33	Other electrical equipment & component mfg	High
33	Battery mfg	High
33	Storage battery mfg	High
33	Primary battery mfg	High
33	Communication & energy wire & cable mfg	High
33	Fiber optic cable mfg	High
33	Other communication & energy wire mfg	High
33	Wiring device mfg	High
33	Currentcarrying wiring device mfg	High
33	Noncurrentcarrying wiring device mfg	High
33	All other electrical equipment & component mfg	High
33	Carbon & graphite product mfg	High
33	All other miscellaneous electrical equipment & component mfg	High
33	Transportation equipment mfg	High
33	Motor vehicle mfg	High
33	Automobile & light duty motor vehicle mfg	High
33	Automobile mfg	High
33	Light truck & utility vehicle mfg	High
33	Heavy duty truck mfg	High
33	Motor vehicle body & trailer mfg	High
33	Motor vehicle body mfg	High
33	Truck trailer mfg	High
33	Motor home mfg	High
33	Travel trailer & camper mfg	High
33	Motor vehicle parts mfg	High
33	Motor vehicle gasoline engine & engine parts mfg	High
33	Carburetor, piston, piston ring, & valve mfg	High
33	Gasoline engine & engine parts mfg	High
33	Motor vehicle electrical & electronic equipment mfg	High
33	Vehicular lighting equipment mfg	High
33	Other motor vehicle electrical & electronic equipment mfg	High
33	Motor vehicle steering & suspension component (except spring) mfg	High
33	Motor vehicle brake system mfg	High
33	Motor vehicle transmission & power train parts mfg	High
33	Motor vehicle seating & interior trim mfg	High
33	Motor vehicle metal stamping	High
33	Other motor vehicle parts mfg	High
33	Motor vehicle airconditioning mfg	High
33	All other motor vehicle parts mfg	High
33	Aerospace product & parts mfg	High
33	Aircraft mfg	High
33	Aircraft engine & engine parts mfg	High
33	Other aircraft part & auxiliary	High

	equipment mfg	
33	Guided missile & space vehicle mfg	High
33	Guided missile & space vehicle propulsion unit & parts mfg	High
33	Other guided missile & space vehicle parts & auxiliary equip mfg	High
33	Railroad rolling stock mfg	High
33	Ship & boat building	High
33	Ship building & repairing	High
33	Boat building	High
33	Other transportation equipment mfg	High
33	Motorcycle, bicycle, & parts mfg	High
33	Military armored vehicle, tank, & tank component mfg	High
33	All other transportation equipment mfg	High
33	Furniture & related product mfg	High
33	Household & institutional furniture & kitchen cabinet mfg	High
33	Wood kitchen cabinet & counter top mfg	High
33	Household & institutional furniture mfg	High
33	Upholstered household furniture mfg	High
33	Nonupholstered wood household furniture mfg	High
33	Metal household furniture mfg	High
33	Household furniture (except wood & metal) mfg	High
33	Institutional furniture mfg	High
33	Wood television, radio, & sewing machine cabinet mfg	High
33	Office furniture (including fixtures) mfg	High
33	Wood office furniture mfg	High
33	Custom architectural woodwork & millwork mfg	High
33	Office furniture (except wood) mfg	High
33	Showcase, partition, shelving, & locker mfg	High
33	Other furniture related product mfg	High
33	Mattress mfg	High
33	Blind & shade mfg	High
33	Miscellaneous mfg	High
33	Medical equipment & supplies mfg	High
33	Laboratory apparatus & furniture mfg	High
33	Surgical & medical instrument mfg	High
33	Surgical appliance & supplies mfg	High
33	Dental equipment & supplies mfg	High
33	Ophthalmic goods mfg	High
33	Dental laboratories	High
33	Other miscellaneous mfg	High
33	Jewelry & silverware mfg	High
33	Jewelry (except costume) mfg	High
33	Silverware & plated ware mfg	High
33	Jewelers' material & lapidary work mfg	High
33	Costume jewelry & novelty mfg	High
33	Sporting & athletic goods mfg	High
33	Doll, toy, & game mfg	High
33	Doll & stuffed toy mfg	High
33	Game, toy, & children's vehicle mfg	High
33	Office supplies (except paper) mfg	High
33	Pen & mechanical pencil mfg	High
33	Lead pencil & art good mfg	High
33	Marking device mfg	High
33	Carbon paper & inked ribbon mfg	High
33	Sign mfg	High
33	All other miscellaneous mfg	High
33	Gasket, packing, & sealing device mfg	High
33	Musical instrument mfg	High
33	Fastener, button, needle, & pin mfg	High
33	Broom, brush, & mop mfg	High
33	Burial casket mfg	High
42	Wholesale trade	Low
42	Wholesale trade, durable goods	Low
42	Motor vehicle & motor vehicle parts & supplies whsle	Low
42	Automobile & other motor vehicle whsle	Low
42	Motor vehicle supplies & new parts whsle	Low
42	Tire & tube whsle	Low
42	Motor vehicle parts, (used) whsle	Low
42	Furniture & home furnishings whsle	Low
42	Furniture whsle	Low
42	Home furnishings whsle	Low
42	Lumber & other construction materials whsle	Low
42	Lumber, plywood, millwork, & wood panel whsle	Low
42	Brick, stone, & related construction materials whsle	Low
42	Roofing, siding, & insulation material whsle	Low
42	Other construction materials whsle	Low
42	Professional & commercial equipment & supplies whsle	Low
42	Photographic equipment & supplies whsle	Low
42	Office equipment whsle	Low
42	Computer & computer peripheral equipment & software whsle	Low
42	Other commercial equipment whsle	Low
42	Medical, dental, & hospital equipment & supplies whsle	Low
42	Ophthalmic goods whsle	Low
42	Other professional equipment & supplies whsle	Low
42	Metal & mineral (except petroleum) whsle	Low
42	Metal service centers & offices	Low
42	Coal & other mineral & ore whsle	Low
42	Electrical goods whsle	Low
42	Electrical apparatus & equip, wiring supp, & const material whsle	Low
42	Electrical appliance, television & radio set whsle	Low
42	Other electronic parts & equipment whsle	Low
42	Hardware, & plumbing & heating equipment & supplies whsle	Low
42	Hardware whsle	Low
42	Plumbing & heating equipment & supplies (hydronics) whsle	Low
42	Warm air heating & airconditioning equipment & supplies whsle	Low
42	Refrigeration equipment & supplies whsle	Low
42	Machinery, equipment, & supplies whsle	Low
42	Construction & mining (except petroleum) machinery & equip whsle	Low
42	Farm & garden machinery & equipment whsle	Low
42	Industrial machinery & equipment whsle	Low
42	Industrial supplies whsle	Low
42	Service establishment equipment & supplies whsle	Low
42	Transportation equipment & supplies (exc. motor vehicle) whsle	Low
42	Miscellaneous durable goods whsle	Low
42	Sporting & recreational goods & supplies whsle	Low
42	Toy & hobby goods & supplies whsle	Low
42	Recyclable material whsle	Low
42	Jewelry/watch/silverware/precious stone, & precious metal whsle	Low
42	Other miscellaneous durable goods whsle	Low
42	Wholesale trade, nondurable goods	Low
42	Paper & paper product whsle	Low
42	Printing & writing paper whsle	Low
42	Stationery & office supplies whsle	Low
42	Industrial & personal service paper whsle	Low
42	Drugs, & druggists' sundries whsle	Low
42	Apparel, piece goods, & notions whsle	Low
42	Piece goods, notions, & other dry goods whsle	Low
42	Men's & boys' clothing & furnishings whsle	Low
42	Women's, children's, & infants' clothing & accessories whsle	Low
42	Footwear whsle	Low
42	Grocery & related products whsle	Low
42	Generalline grocery whsle	Low
42	Packaged frozen food whsle	Low
42	Dairy products, (except dried or canned) whsle	Low
42	Poultry & poultry product whsle	Low
42	Confectionery whsle	Low
42	Fish & seafood whsle	Low
42	Meat & meat product whsle	Low
42	Fresh fruit & vegetable whsle	Low
42	Other grocery & related products whsle	Low
42	Farmproduct raw material whsle	Low
42	Grain & field bean whsle	Low
42	Livestock whsle	Low
42	Other farm product raw material whsle	Low
42	Chemical & allied products whsle	Low
42	Plastics materials & basic forms & shapes whsle	Low
42	Other chemical & allied products whsle	Low
42	Petroleum & petroleum products whsle	Low
42	Petroleum bulk stations & terminals	Low
42	Petroleum & petroleum prod whsle (exc. bulk stations & terminals)	Low
42	Beer, wine, & distilled alcoholic beverage whsle	Low
42	Beer & ale whsle	Low
42	Wine & distilled alcoholic beverage whsle	Low
42	Miscellaneous nondurable goods whsle	Low
42	Farm supplies whsle	Low
42	Book, periodical, & newspaper whsle	Low
42	Flower, nursery stock, & florists' supplies whsle	Low
42	Tobacco & tobacco product whsle	Low
42	Paint, varnish, & supplies whsle	Low
42	Other miscellaneous nondurable goods whsle	Low
44	Retail Trade	High
44	Motor vehicle & parts dealers	High
44	Automobile dealers	High
44	New car dealers	High
44	Used car dealers	High
44	Other motor vehicle dealers	High
44	Recreational vehicle dealers	High
44	Motorcycle, boat, & other motor vehicle dealers	High
44	Motorcycle dealers	High
44	Boat dealers	High
44	All other motor vehicle dealers	High
44	Automotive parts, accessories, & tire stores	High
44	Automotive parts & accessories stores	High
44	Tire dealers	High
44	Furniture & home furnishings stores	High
44	Furniture stores	High
44	Home furnishings stores	High
44	Floor covering stores	High
44	Other home furnishings stores	High
44	Window treatment stores	High
44	All other home furnishings stores	High
44	Electronics & appliance stores	High

44	Appliance, television, & other electronics stores	High
44	Household appliance stores	High
44	Radio, television, & other electronics stores	High
44	Computer & software stores	High
44	Camera & photographic supplies stores	High
44	Building material & garden equipment & supplies dealers	High
44	Building material & supplies dealers	High
44	Home centers	High
44	Paint & wallpaper stores	High
44	Hardware stores	High
44	Other building material dealers	High
44	Lawn & garden equipment & supplies stores	High
44	Outdoor power equipment stores	High
44	Nursery & garden centers	High
44	Food & beverage stores	High
44	Grocery stores	High
44	Supermarkets & other grocery (except convenience) stores	High
44	Convenience stores	High
44	Specialty food stores	High
44	Meat markets	High
44	Fish & seafood markets	High
44	Fruit & vegetable markets	High
44	Other specialty food stores	High
44	Baked goods stores	High
44	Confectionery & nut stores	High
44	All other specialty food stores	High
44	Beer, wine, & liquor stores	High
44	Health & personal care stores	High
44	Pharmacies & drug stores	High
44	Cosmetics, beauty supplies, & perfume stores	High
44	Optical goods stores	High
44	Other health & personal care stores	High
44	Food (health) supplement stores	High
44	All other health & personal care stores	High
44	Gasoline stations	High
44	Gasoline stations with convenience stores	High
44	Other gasoline stations	High
44	Clothing & clothing accessories stores	High
44	Clothing stores	High
44	Men's clothing stores	High
44	Women's clothing stores	High
44	Children's & infants' clothing stores	High
44	Family clothing stores	High
44	Clothing accessories stores	High
44	Other clothing stores	High
44	Shoe stores	High
44	Jewelry, luggage, & leather goods stores	High
44	Jewelry stores	High
44	Luggage & leather goods stores	High
45	Sporting goods, hobby, book, & music stores	High
45	Sporting goods, hobby, & musical instrument stores	High
45	Sporting goods stores	High
45	Hobby, toy, & game stores	High
45	Sewing, needlework, & piece goods stores	High
45	Musical instrument & supplies stores	High
45	Book, periodical, & music stores	High
45	Book stores & news dealers	High
45	Book stores	High
45	News dealers & newsstands	High
45	Prerecorded tape, compact disc, & record stores	High
45	General merchandise stores	High
45	Department stores	High
45	Other general merchandise stores	High
45	Warehouse clubs & superstores	High
45	All other general merchandise stores	High

45	Miscellaneous store retailers	High
45	Florists	High
45	Office supplies, stationery, & gift stores	High
45	Office supplies & stationery stores	High
45	Gift, novelty, & souvenir stores	High
45	Used merchandise stores	High
45	Other miscellaneous store retailers	High
45	Pet & pet supplies stores	High
45	Art dealers	High
45	Manufactured (mobile) home dealers	High
45	All other miscellaneous store retailers	High
45	Tobacco stores	High
45	All other miscellaneous store retailers (except tobacco stores)	High
45	Nonstore retailers	High
45	Electronic shopping & mailorder houses	High
45	Vending machine operators	High
45	Direct selling establishments	High
45	Fuel dealers	High
45	Heating oil dealers	High
45	Liquefied petroleum gas (bottled gas) dealers	High
45	Other fuel dealers	High
45	Other direct selling establishments	High
48	Transportation & Warehousing	Low
48	Air transportation	Low
48	Scheduled air transportation	Low
48	Scheduled passenger air transportation	Low
48	Scheduled freight air transportation	Low
48	Nonscheduled air transportation	Low
48	Nonscheduled chartered passenger air transportation	Low
48	Nonscheduled chartered freight air transportation	Low
48	Other nonscheduled air transportation	Low
48	Water transportation	Low
48	Deep sea, coastal, & Great Lakes water transportation	Low
48	Deep sea freight transportation	Low
48	Deep sea passenger transportation	Low
48	Coastal & Great Lakes freight transportation	Low
48	Coastal & Great Lakes passenger transportation	Low
48	Inland water transportation	Low
48	Inland water freight transportation	Low
48	Inland water passenger transportation	Low
48	Truck transportation	Low
48	General freight trucking	Low
48	General freight trucking, local	Low
48	General freight trucking, longdistance	Low
48	General freight trucking, longdistance, truckload	Low
48	General freight trucking, longdistance, less than truckload	Low
48	Specialized freight trucking	Low
48	Used household & office goods moving	Low
48	Specialized freight (except used goods) trucking, local	Low
48	Specialized freight (except used goods) trucking, longdistance	Low
48	Transit & ground passenger transportation	Low
48	Urban transit systems	Low
48	Mixed mode transit systems	Low
48	Commuter rail systems	Low
48	Bus & motor vehicle transit systems	Low
48	Other urban transit systems	Low
48	Interurban & rural bus transportation	Low
48	Taxi & limousine service	Low
48	Taxi service	Low

48	Limousine service	Low
48	School & employee bus transportation	Low
48	Charter bus industry	Low
48	Other transit & ground passenger transportation	Low
48	Special needs transportation	Low
48	All other transit & ground passenger transportation	Low
48	Pipeline transportation	Low
48	Pipeline transportation of crude oil	Low
48	Pipeline transportation of natural gas	Low
48	Other pipeline transportation	Low
48	Pipeline transportation of refined petroleum products	Low
48	All other pipeline transportation	Low
48	Scenic & sightseeing transportation	Low
48	Scenic & sightseeing transportation, land	Low
48	Scenic & sightseeing transportation, water	Low
48	Scenic & sightseeing transportation, other	Low
48	Support activities for transportation	Low
48	Support activities for air transportation	Low
48	Airport operations	Low
48	Air traffic control	Low
48	Other airport operations	Low
48	Other support activities for air transportation	Low
48	Support activities for rail transportation	Low
48	Support activities for water transportation	Low
48	Port & harbor operations	Low
48	Marine cargo handling	Low
48	Navigational services to shipping	Low
48	Other support activities for water transportation	Low
48	Support activities for road transportation	Low
48	Motor vehicle towing	Low
48	Other support activities for road transportation	Low
48	Freight transportation arrangement	Low
48	Other support activities for transportation	Low
48	Packing & crating	Low
48	All other support activities for transportation	Low
49	Couriers & messengers	Low
49	Couriers	Low
49	Local messengers & local delivery	Low
49	Warehousing & storage	Low
49	General warehousing & storage	Low
49	Refrigerated warehousing & storage	Low
49	Farm product warehousing & storage	Low
49	Other warehousing & storage	Low
51	Information	Low
51	Publishing industries	Low
51	Newspaper, periodical, book, & database publishers	Low
51	Newspaper publishers	Low
51	Periodical publishers	Low
51	Book publishers	Low
51	Database & directory publishers	Low
51	Other publishers	Low
51	Greeting card publishers	Low
51	All other publishers	Low
51	Software publishers	Low
51	Motion picture & sound recording industries	Low
51	Motion picture & video industries	Low
51	Motion picture & video production	Low
51	Motion picture & video distribution	Low
51	Motion picture & video exhibition	Low

51	Motion picture theaters (except driveins)	Low
51	Drivein motion picture theaters	Low
51	Postproduction & other motion picture & video industries	Low
51	Teleproduction & other postproduction services	Low
51	Other motion picture & video industries	Low
51	Sound recording industries	Low
51	Record production	Low
51	Integrated record production/distribution	Low
51	Music publishers	Low
51	Sound recording studios	Low
51	Other sound recording industries	Low
51	Broadcasting & telecommunications	Low
51	Radio & television broadcasting	Low
51	Radio broadcasting	Low
51	Radio networks	Low
51	Radio stations	Low
51	Television broadcasting	Low
51	Cable networks & program distribution	Low
51	Cable networks	Low
51	Cable & other program distribution	Low
51	Telecommunications	Low
51	Wired telecommunications carriers	Low
51	Wireless telecommunications carriers (except satellite)	Low
51	Paging	Low
51	Cellular & other wireless telecommunications	Low
51	Telecommunications resellers	Low
51	Satellite telecommunications	Low
51	Other telecommunications	Low
51	Information services & data processing services	Low
51	Information services	Low
51	News syndicates	Low
51	Libraries & archives	Low
51	Other information services	Low
51	Online information services	Low
51	All other information services	Low
51	Data processing services	Low
52	Finance & insurance	Low
52	Monetary authorities central bank	Low
52	Credit intermediation & related activities	Low
52	Depository credit intermediation	Low
52	Commercial banking	Low
52	Savings institutions	Low
52	Credit unions	Low
52	Other depository credit intermediation	Low
52	Nondepository credit intermediation	Low
52	Credit card issuing	Low
52	Sales financing	Low
52	Other nondepository credit intermediation	Low
52	Consumer lending	Low
52	Real estate credit	Low
52	International trade financing	Low
52	Secondary market financing	Low
52	All other nondepository credit intermediation	Low
52	Activities related to credit intermediation	Low
52	Mortgage & nonmortgage loan brokers	Low
52	Financial transactions processing, reserve, & clearinghouse act	Low
52	Other activities related to credit intermediation	Low
52	Securities intermediation & related activities	Low
52	Securities & commodity contracts intermediation & brokerage	Low
52	Investment banking & securities dealing	Low
52	Securities brokerage	Low
52	Commodity contracts dealing	Low
52	Commodity contracts brokerage	Low
52	Securities & commodity exchanges	Low
52	Other financial investment activities	Low
52	Miscellaneous intermediation	Low
52	Portfolio management	Low
52	Investment advice	Low
52	All other financial investment activities	Low
52	Trust, fiduciary, & custody activities	Low
52	Miscellaneous financial investment activities	Low
52	Insurance carriers & related activities	Low
52	Insurance carriers	Low
52	Direct life, health, & medical insurance carriers	Low
52	Direct life insurance carriers	Low
52	Direct health & medical insurance carriers	Low
52	Other direct insurance carriers	Low
52	Direct property & casualty insurance carriers	Low
52	Direct title insurance carriers	Low
52	All other direct insurance carriers	Low
52	Reinsurance carriers	Low
52	Agencies, brokerages, & other insurance related activities	Low
52	Insurance agencies & brokerages	Low
52	Other insurance related activities	Low
52	Claims adjusting	Low
52	Third party administration of insurance & pension funds	Low
52	All other insurance related activities	Low
52	Funds, trusts, & other financial vehicles (part)	Low
52	Other investment pools & funds (part)	Low
52	Openend investment funds	Low
52	Real Estate Investment Trusts (REITs)	Low
52	Other financial vehicles	Low
53	Real estate & rental & leasing	Low
53	Real estate	Low
53	Lessors of real estate	Low
53	Lessors of residential buildings & dwellings	Low
53	Lessors of nonresidential buildings (except miniwarehouses)	Low
53	Lessors of miniwarehouses & self storage units	Low
53	Lessors of other real estate property	Low
53	Offices of real estate agents & brokers	Low
53	Activities related to real estate	Low
53	Real estate property managers	Low
53	Residential property managers	Low
53	Nonresidential property managers	Low
53	Offices of real estate appraisers	Low
53	Other activities related to real estate	Low
53	Rental & leasing services	Low
53	Automotive equipment rental & leasing	Low
53	Passenger car rental & leasing	Low
53	Passenger car rental	Low
53	Passenger car leasing	Low
53	Truck, utility trailer, & RV rental & leasing	Low
53	Consumer goods rental	Low
53	Consumer electronics & appliances rental	Low
53	Formal wear & costume rental	Low
53	Video tape & disk rental	Low
53	Other consumer goods rental	Low
53	Home health equipment rental	Low
53	Recreational goods rental	Low
53	All other consumer goods rental	Low
53	General rental centers	Low
53	Commercial & industrial machinery & equipment rental & leasing	Low
53	Const/trans/mining/forestry machinery & equip rental & leasing	Low
53	Commercial air/rail/water transportation equip rental & leasing	Low
53	Construction/mining/forestry machinery & equip rental & leasing	Low
53	Office machinery & equipment rental & leasing	Low
53	Oth commercial/industrial machinery & equipment rental & leasing	Low
53	Lessors of intangible assets, except copyrighted works	Low
54	Professional, scientific, & technical services	High
54	Legal services	High
54	Offices of lawyers	High
54	Other legal services	High
54	Title abstract & settlement offices	High
54	All other legal services	High
54	Accounting, tax return prep, bookkeeping, & payroll services	High
54	Offices of certified public accountants	High
54	Tax return preparation services	High
54	Payroll services	High
54	Other accounting services	High
54	Architectural, engineering, & related services	High
54	Architectural services	High
54	Landscape architectural services	High
54	Engineering services	High
54	Drafting services	High
54	Building inspection services	High
54	Geophysical surveying & mapping services	High
54	Surveying & mapping (except geophysical) services	High
54	Testing laboratories	High
54	Specialized design services	High
54	Interior design services	High
54	Industrial design services	High
54	Graphic design services	High
54	Other specialized design services	High
54	Computer systems design & related services	High
54	Custom computer programming services	High
54	Computer systems design services	High
54	Computer facilities management services	High
54	Other computer related services	High
54	Management, scientific, & technical consulting services	High
54	Management consulting services	High
54	Administrative management & general management consulting service	High
54	Human resources & executive search consulting services	High
54	Marketing consulting services	High
54	Process, physical distribution, & logistics consulting services	High
54	Other management consulting services	High
54	Environmental consulting services	High
54	Other scientific & technical consulting services	High
54	Scientific research & development services	High
54	R&D in the physical, engineering, & life sciences	High
54	Research & development in the social sciences & humanities	High
54	R&D in the social sciences & humanities	High
54	Advertising & related services	High
54	Advertising agencies	High
54	Public relations agencies	High
54	Media buying services	High
54	Media representatives	High
54	Display advertising	High

54	Direct mail advertising	High
54	Advertising material distribution services	High
54	Other services related to advertising	High
54	Other professional, scientific, & technical services	High
54	Marketing research & public opinion polling	High
54	Photographic services	High
54	Photographic studios, portrait	High
54	Commercial photography	High
54	Translation & interpretation services	High
54	Veterinary services	High
54	All other professional, scientific, & technical services	High
55	Management of companies & enterprises	High
55	Offices of bank holding companies	High
55	Offices of other holding companies	High
55	Corporate, subsidiary, & regional managing offices	High
56	Administrative & support & waste management & remediation serv	High
56	Administrative & support services	High
56	Office administrative services	High
56	Facilities support services	High
56	Employment services	High
56	Employment placement agencies	High
56	Temporary help services	High
56	Employee leasing services	High
56	Business support services	High
56	Document preparation services	High
56	Telephone call centers	High
56	Telephone answering services	High
56	Telemarketing bureaus	High
56	Business service centers	High
56	Private mail centers	High
56	Other business service centers (including copy shops)	High
56	Collection agencies	High
56	Credit bureaus	High
56	Other business support services	High
56	Repossession services	High
56	Court reporting & stenotype services	High
56	All other business support services	High
56	Travel arrangement & reservation services	High
56	Travel agencies	High
56	Tour operators	High
56	Other travel arrangement & reservation services	High
56	Convention & visitors bureaus	High
56	All other travel arrangement & reservation services	High
56	Investigation & security services	High
56	Investigation, guard, & armored car services	High
56	Investigation services	High
56	Security guards & patrol services	High
56	Armored car services	High
56	Security systems services	High
56	Security systems services (except locksmiths)	High
56	Locksmiths	High
56	Services to buildings & dwellings	High
56	Exterminating & pest control services	High
56	Janitorial services	High
56	Landscaping services	High
56	Carpet & upholstery cleaning services	High
56	Other services to buildings & dwellings	High
56	Other support services	High
56	Packaging & labeling services	High
56	Convention & trade show organizers	High
56	All other support services	High
56	Waste management & remediation services	High
56	Waste collection	High
56	Solid waste collection	High
56	Hazardous waste collection	High
56	Other waste collection	High
56	Waste treatment & disposal	High
56	Hazardous waste treatment & disposal	High
56	Solid waste landfill	High
56	Solid waste combustors & incinerators	High
56	Other nonhazardous waste treatment & disposal	High
56	Remediation & other waste management services	High
56	Remediation services	High
56	Materials recovery facility	High
56	All other waste management services	High
56	Septic tank & related services	High
56	All other miscellaneous waste management services	High
61	Educational services	High
61	Elementary & secondary schools	High
61	Junior colleges	High
61	Colleges, universities, & profesional schools	High
61	Business schools, & computer & management training	High
61	Business & secretarial schools	High
61	Computer training	High
61	Professional & management development training	High
61	Technical & trade schools	High
61	Cosmetology & barber schools	High
61	Flight training	High
61	Apprenticeship training	High
61	Other trade & technical schools	High
61	Other schools & instruction	High
61	Fine arts schools	High
61	Sports & recreation instruction	High
61	Language schools	High
61	All other schools & instruction	High
61	Exam preparation & tutoring	High
61	Automobile driving schools	High
61	All other miscellaneous schools & instruction	High
61	Educational support services	High
62	Health care & social assistance	High
62	Ambulatory health care services	High
62	Offices of physicians	High
62	Offices of physicians (except mental health specialists)	High
62	Offices of physicians, mental health specialists	High
62	Offices of dentists	High
62	Offices of other health practitioners	High
62	Offices of chiropractors	High
62	Offices of optometrists	High
62	Offices of mental health practitioners (except physicians)	High
62	Offices of physical, occup, & speech therapists & audiologists	High
62	Offices of all other health practitioners	High
62	Offices of podiatrists	High
62	Offices of all other miscellaneous health practitioners	High
62	Outpatient care centers	High
62	Family planning centers	High
62	Outpatient mental health & substance abuse centers	High
62	Other outpatient care centers	High
62	HMO medical centers	High
62	Kidney dialysis centers	High
62	Freestanding ambulatory surgical & emergency centers	High
62	All other outpatient care centers	High
62	Medical & diagnostic laboratories	High
62	Medical laboratories	High
62	Diagnostic imaging centers	High
62	Home health care services	High
62	Other ambulatory health care services	High
62	Ambulance services	High
62	All other ambulatory health care services	High
62	Blood & organ banks	High
62	All other miscellaneous ambulatory health care services	High
62	Hospitals	High
62	General medical & surgical hospitals	High
62	Psychiatric & substance abuse hospitals	High
62	Specialty (except psychiatric & substance abuse) hospitals	High
62	Nursing & residential care facilities	High
62	Nursing care facilities	High
62	Residential mental retardation/health & substance abuse facility	High
62	Residential mental retardation facilities	High
62	Residential mental health & substance abuse facilities	High
62	Community care facilities for the elderly	High
62	Continuing care retirement communities	High
62	Homes for the elderly	High
62	Other residential care facilities	High
62	Social assistance	High
62	Individual & family services	High
62	Child & youth services	High
62	Services for the elderly & persons with disabilities	High
62	Other individual & family services	High
62	Community food & housing/emergency & other relief services	High
62	Community food services	High
62	Community housing services	High
62	Temporary shelters	High
62	Other community housing services	High
62	Emergency & other relief services	High
62	Vocational rehabilitation services	High
62	Child day care services	High
71	Arts, entertainment, & recreation	High
71	Performing arts, spectator sports, & related industries	High
71	Performing arts companies	High
71	Theater companies & dinner theaters	High
71	Dance companies	High
71	Musical groups & artists	High
71	Other performing arts companies	High
71	Spectator sports	High
71	Sports teams & clubs	High
71	Racetracks	High
71	Other spectator sports	High
71	Promoters of performing arts, sports, & similar events	High
71	Promoters of performing arts, sports, & similar events w/facility	High
71	Promoters of performing arts, sports, & similar events w/o facil	High
71	Agents/managers for artists, athletes, & other public figures	High
71	Independent artists, writers, & performers	High
71	Museums, historical sites, & similar institutions	High
71	Museums	High
71	Historical sites	High
71	Zoos & botanical gardens	High
71	Nature parks & other similar institutions	High
71	Amusement, gambling, & recreation industries	High
71	Amusement parks & arcades	High
71	Amusement & theme parks	High
71	Amusement arcades	High
71	Gambling industries	High
71	Casinos (except casino hotels)	High
71	Other gambling industries	High
71	Other amusement & recreation services	High
71	Golf courses & country clubs	High
71	Skiing facilities	High
71	Marinas	High
71	Fitness & recreational sports	High

	centers	
71	Bowling centers	High
71	All other amusement & recreation industries	High
72	Accommodation & foodservices	High
72	Accommodation	High
72	Traveler accommodation	High
72	Hotels (except casino hotels) & motels	High
72	Casino hotels	High
72	Other traveler accommodation	High
72	Bed & breakfast inns	High
72	All other traveler accommodation	High
72	RV (recreational vehicle) parks & recreational camps	High
72	RV (recreational vehicle) parks & campgrounds	High
72	Recreational & vacation camps (except campgrounds)	High
72	Rooming & boarding houses	High
72	Foodservices & drinking places	High
72	Fullservice restaurants	High
72	Limitedservice eating places	High
72	Limitedservice restaurants	High
72	Cafeterias	High
72	Snack & nonalcoholic beverage bars	High
72	Special foodservices	High
72	Foodservice contractors	High
72	Caterers	High
72	Mobile foodservices	High
72	Drinking places (alcoholic beverages)	High
81	Other services (except public administration)	High
81	Repair & maintenance	High
81	Automotive repair & maintenance	High
81	Automotive mechanical & electrical repair & maintenance	High
81	General automotive repair	High
81	Automotive exhaust system repair	High
81	Automotive transmission repair	High
81	Other automotive mechanical & electrical repair & maintenance	High
81	Automotive body, paint, interior, & glass repair	High
81	Automotive body, paint, & interior repair & maintenance	High
81	Automotive glass replacement shops	High
81	Other automotive repair & maintenance	High
81	Automotive oil change & lubrication shops	High
81	Carwashes	High
81	All other automotive repair & maintenance	High
81	Electronic & precision equipment repair & maintenance	High
81	Consumer electronics repair & maintenance	High
81	Computer & office machine repair & maintenance	High
81	Communication equipment repair & maintenance	High
81	Other electronic & precision equipment repair & maintenance	High
81	Commercial & industrial machinery & equip (exc auto & electr) R&M	High
81	Personal & household goods repair & maintenance	High
81	Home & garden equipment & appliance repair & maintenance	High
81	Home & garden equipment repair & maintenance	High
81	Appliance repair & maintenance	High
81	Reupholstery & furniture repair	High
81	Footwear & leather goods repair	High
81	Other personal & household goods repair & maintenance	High
81	Personal & laundry services	High
81	Personal care services	High
81	Hair, nail, & skin care services	High
81	Barber shops	High
81	Beauty shops	High
81	Nail salons	High
81	Other personal care services	High
81	Diet & weight reducing services	High
81	Death care services	High
81	Funeral homes & funeral services	High
81	Cemeteries & crematories	High
81	Drycleaning & laundry services	High
81	Coinoperated laundries & drycleaners	High
81	Drycleaning & laundry services (except coinoperated)	High
81	Linen & uniform supply	High
81	Linen supply	High
81	Industrial launderers	High
81	Other personal services	High
81	Pet care (except veterinary services)	High
81	Photofinishing	High
81	Photofinishing laboratories (except onehour)	High
81	Onehour photofinishing	High
81	Parking lots & garages	High
81	All other personal services	High
81	Religious/grantmaking/civic/professional & similar org	High
81	Religious organizations	High
81	Grantmaking & giving services	High
81	Grantmaking foundations	High
81	Voluntary health organizations	High
81	Other grantmaking & giving services	High
81	Social advocacy organizations	High
81	Human rights organizations	High
81	Environment, conservation, & wildlife organizations	High
81	Other social advocacy organizations	High
81	Civic & social organizations	High
81	Business/professional/labor/political/& similar organizations	High
81	Business associations	High
81	Professional organizations	High
81	Labor unions & similar labor organizations	High
81	Political organizations	High
81	Other similar organizations (exc bus, prof, labor, & political)	High
95	Auxiliaries, exc corp, subsidiary, & regional managing offices	#N/A
99	Unclassified	#N/A

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