Dynamics of Organizational Populations - An Ecological Analysis of the Corporate Identity Consultancy in Shenzhen, China

ZHANG, JIANMING

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Jianming Zhang

Durham Business School

A Thesis Submitted for the Degree of Doctor of Philosophy at the University of Durham

June 2010

Abstract

This thesis addresses two main theoretical issues within the field of organizational ecology, namely: (1) competition dynamics of organizations in a fuzzy-set construction, and (2) emergence of organizational forms, in the context of corporate identity consultancy in Shenzhen, China. The empirical setting is significantly different from existing organizational studies, in that the population under observation is constructed following the recently developed fuzzy-set theory. Fuzzy-set concept is the foundation of this thesis, upon which hypotheses and theories are constructed.

Firstly, I revisit density-dependent theory in the new fuzzy setup, using the reformulated specification of fuzzy density. I find that the well-known theory does not hold in a fuzzy context. I speculate that the inconsistence is perhaps due to missing information in the fuzzy density measure. As such, I argue that density-dependent theory alone might not be sufficient to explain organizational dynamics in a fuzzy population. I proceed by investigating the competitive relationship among firms with varying degree of grade of membership (GoM). I find that population with neutral valence (i.e., it is at its initial stage of operation) favours organizations that are less focused on the offer that associated with the population, since less-focused organizations enjoy various protection from existing resources, and the potency of cultural classification at such stage is largely dormant. As the population ages, the potency of cultural classification is triggered and now poses significant constraints on population members, therefore population with positive valence (i.e., it is aged) favours organizations with higher GoM (i.e., those that are more focused on the offer), thanks to their higher level of intrinsic appeal.

Secondly, I examine the possibility that CI industry may become a (cognitive) organizational form. Following the recently developed theory of contrast dependence (Hannan, Pólos et al. 2007), I find that the underlying mechanism of legitimation is more delicate than predicted by the theory. In particular, I find that if carrying capacity

of an environment is small, a conglomeration of members with high GoM will (temporarily) intensify competition and hamper legitimation of the population. However, if carrying capacity is sufficiently expanded, population-level legitimation will work hand in hand with the contrast level. The results show that environment is endogenous, rather than exogenous, as assumed in all available ecological models. Given the (increasingly) low level of population contrast at late stage, I suggest that the CI population may never become an organizational form.

Taken together, the thesis shows that bringing fuzzy-set theory into organizational study opens the door to the development of abundant theories, and it appears that the dynamics of the world of organizations can be better explained by the fuzzy approach.

Statement of Copyright

Acknowledgments

Completing this thesis would not have been possible without the help and support of many people along the way.

First and foremost I offer my sincerest gratitude to my principal advisor László Pólos, who has supported me throughout my thesis with his patience and knowledge whilst allowing me the room to work in my own way. Above all and the most needed, he provided me unflinching encouragement and guidance in various ways. One simply could not wish for a better or friendlier supervisor.

I also wish to express my deep gratitude to my second advisor Dave McKendrick for his advice, supervision, and guidance. He was very supportive throughout my thesis. His advice has always been valuable, intellectually inspiring and encouraging.

Special thanks to Les Graham and Gábor Péli, who, despite their busy schedule, kindly agreed to be members of my committee and provided valuable comments and advice. I especially wish to thank Les Graham, for his support and guidance during my final stage of thesis revision.

I am grateful to James Wade for the instruction he gave when he was in Durham. He used his precious time introducing me to event history analysis step by step, which significantly eased my comprehension of the research method.

I am also grateful to Jeroen Kuilman for commenting on my thesis. His thoughtful comments substantially helped me to improve theories development and overall structure of the thesis. I especially wish to thank Wang Chong, who helped me with creating a wonderful program which made the collection and coding of my data possible.

I gratefully acknowledge the financial support of Durham University Business School, which made my four years of doctoral study possible and allowed me to receive research training at Essex University Summer School.

I wish to express my heartfelt appreciation to my fiancée Helen Song whose dedication, love and persistent confidence in me, has taken the load off my shoulder. I owe her for not being a competent fiancé and letting her struggling alone for so long for the family. Here I would like to say a big thank you, maomao.

Finally, I offer my regards and blessings to all of those who supported me in any respect during the completion of the thesis, especially my parents, and my friends.

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Notation of Symbols Used

Symbol	Denotation
N_w	Classic density of the whole population
N_{fw}	Fuzzy density of the whole population
N_c	Classic density of the CI category
N_{ww}	Weighted density of the whole population
N_{wc}	Weighted density of the CI category
C	Population contrast ($C = N_c / N_w$)
C_w	Weighted population contrast ($C_w = N_{wc} / N_{ww}$)
GoM_t	Grade of membership at time t

Chapter One

Introduction

Over the last two decades, China has witnessed vigorous development of a nascent market – corporate identity consultancy, which are consulting firms specialized in the management of "tangible" (e.g., corporate title, logo, letterhead, etc.) and "intangible" organizational identity (e.g., mission statement, values, and organization structure, etc.). While the concept of corporate identity (CI) was largely unknown in China in the early 1980s, CI is today hailed as an omnipotent strategic instrument and a means to achieve competitive advantage. There were few companies specified in this domain 19 years ago. In 2007, however, the members of the population proliferate to tens of thousands nationwide. The CI movement was further exhilarated by a variety of media and literature focused on the area. In 1996 and 2004, two industry associations were founded, which signals a somewhat regulated and established CI market. As a leading special economic zone in China, Shenzhen[1] has experienced an even more frantic fever of the CI movement. Although it is not the cradle of the business, it is however the most concentrated city in China in terms of CI business. During the height of CI fever in the late 1990s, numerous CI seminars and workshops were held everywhere in the city. In 2003 there were nearly one thousand CI firms located in the city alone, accounting for over one fifth of the industry nationwide (Zhang 2005).

The industry in recent years, however, experienced a serious retrogression. Foundings significantly dropped, and a large number of CI firms either failed or exited to another industry. Some of the existing firms changed their names in the hope that they could stay competitive in the market. The industry suddenly found itself in an embarrassing situation. Some critics began to question whether the industry is a sustainable one, or just a flash in the pan. Many CI enthusiasts believe that the industry is well positioned in the market. For example, as one of the top CI specialists in China, Mei (2002) in his

[1] Shenzhen is a coastal city of south china, next to Hong Kong.

book asserted that "…today's CI business in China has grown and become an established industry…". Others however are highly sceptical about the established status of the business. They doubt that the industry is just a transitional product and may not be able to undergo severe test in the market. One scholar in Sun Yat-sen University even went so far as to suggest that it is time to dump the CI concept in a bin. Of course, both sides can always find traces of evidence supporting their argument.

On the one hand, the magnitude of growth of CI firms in the past decades plus the formation of two industry associations would prompt us to believe that the nascent industry is, to a certain degree, matured and established. Furthermore, a careful examination of the data found that the number of CI firms entering the market, after more than ten years of sharp increase, eventually declined and somewhat stabilized in recent years. According to the well-known density-dependence theory, which holds that legitimation of a population increases with density at a decreasing rate and approaches a ceiling at high level of density (see Hannan and Carroll 1992 for a detailed discussion), it is reasonable to speculate that the CI population became a legitimated organizational form at a certain point before the density level of the population stabilized[2]. In other words, the industry is supposed to be widely recognized by public audiences.

On the other hand, a careful examination of the industry, however, reveals a situation to the contrary. Despite the formation of industry associations, the population of CI consultancy as a whole remains elusive and confusing. The ambiguity of the industry can be traced back to the concept itself. In fact, there is neither a universally accepted definition of CI, nor the specific elements constituting the CI construct (van Riel and Balmer 1997; Melewar, Karaosmanoglu et al. 2005). In practice, similar confusion not only perplexes outsiders, but also insiders as well. Since corporate identity has its root in design, it is not uncommon for external audiences to confuse CI consultancies with graphic designers. In fact, many so-called corporate identity consultancies, to all intents and purposes, are graphic design firms. The situation is not better for insiders either. After nearly two decades of development, CI practitioners still have great trouble in reaching agreement on the meaning of the CI concept. They often find it

[2] Legitimation in this thesis refers to constitutive legitimation. In its loose term it means social recognition of a particular concept, i.e., the concept attains a socially taken-for-granted character.

problematic to position themselves in the spectrum between graphic designer and management consultant. Faced with such ambiguity over the business, it is hard to believe that the industry is legitimated.

The above "fog" enveloping the CI business makes it an interesting population that warrant closer analysis. It is natural to ask, is CI consultancy in Shenzhen a well established industry? Or, to put it more formally, is CI consultancy a legitimated organizational form? If not, then another question follows: how and when will the CI population become legitimated? Legitimation, as suggested by a number of organizational theorists (Hannan and Carroll 1992; Pólos, Hannan et al. 2002), is usually a matter of life and death for organizations, since it directly affects resource availability applicable to organizations. Part of the goals of this thesis is therefore to address the above questions.

Another interesting feature (which is closely associated with the "fog" outlined earlier) of CI population is that the business contains a large number of categorically different firms which claim that they also offer CI consulting service, for instance, graphic design firms, advertising agencies, investment consultants, etc. Some of them are very similar to CI firms (e.g., graphic design firms), some of them however are very dissimilar (e.g., investment consultants). The presence of such large cohorts of diverse firms obscures the contour of CI population, and makes it appear "fuzzy". The fuzzy setup significantly differs from existing organizational studies in which organizational populations are typically treated as classical sets. However, such a setup is viewed as more realistic in the real world, as natural categories in reality tend to lack sharp boundaries (Rosch 1973). The fuzzy character of the population makes it an ideal business to test the recently developed fuzzy-set theory (see Hannan, Pólos et al. 2007), which has appealing development prospect but largely remains untested.

1.1 Motivation

This thesis aims to apply the framework of organizational ecology to organizational dynamics in a Chinese context. Introduced in 1977 by Hannan and Freeman and later refined in their book "*Organizational Ecology*" (1989), organizational ecology has

over the years become one of the central fields in organizational studies. It is a field of research that directs at explaining changes in the composition and diversity of worlds of organizations ("composition" here refers to alternation in the mix of organizations within populations, and "diversity" refers to a widening set of organizational forms). The research programme has a strong demographic character. Empirically, it focuses on the modelling of the so called vital rates of organizational founding and mortality, using retrospective longitudinal data on organizational populations.

Since its introduction, the research paradigm has been applied in a wide variety of organizational environments. However, the bulk of such research has been conducted in developed economies, especially in the U.S. and European contexts. Ecological research in non-western, developing economies are scarce. There are a few examples, though, including Messallam (1998)'s study of investment firms in Egypt, Kuilman and Li (2006)'s investigation of foreign banks in Shanghai China, and the study conducted by Li and his colleagues (2007) examining the legitimation process of wholly owned foreign subsidiaries in China. Nevertheless, the attention received by developing economies to date is largely disproportionate to their growing influence on the world stage, especially China. Being the largest developing economy in the world, China proved to be the fertile ground for diversification of organizational forms. In the past three decades, China has witnessed the growth of a large variety of businesses which never existed before, or re-emerged from a period of dormancy (as in the case of foreign banks studied by Kuilman (2005)). Since many industries are still in their emergent stage (which stands in contrast with the western environment in which most industries are more or less established), business firms in China are typically exposed to a higher level of selection pressure. Today, China's market is evolving at a pace rarely seen in other parts of the world, which in turn indicates that it is indeed an ideal environment for studying organizational dynamics and form evolution.

The reason I chose to focus on corporate identity consultancy is because it is one of the most dynamic industry clusters in China. Two features make the population especially appealing: (1) the nascent industry appears to be a fusion form of two relatively more established industries, namely, graphic design and strategy management consultancy. Fusion form has important bearing on theories development in an ecological framework, however it has rarely been empirically studied (but see Oliver and

Montgomery 2000); (2) the magnitude of growth and exits of CI firms within a relatively short period make it a highly turbulent industry (in fact, more than half of them have failed so far), whereas a turbulent population is usually an ideal context to examine organizational dynamics and improve the accuracy of theory predictions.

Why was Shenzhen chosen as the city of study? The reason is straightforward: it is the most concentrated city in China in terms of CI consulting business. The concentration level makes it a highly representative market in the country. The study focuses at a city level, however, may invite questions about its generalizability of the results: can they be applied in other parts of the country? Indeed, China is well documented by its economic fragmentation, which is manifested by local protectionism and power decentralization (see Young 2000; Huang 2001; Poncet 2005 for a detailed discussion). In other words, socio-political environments in different areas of the country may substantially differ (especially in governmental regulations), which in turn should affect generalizability of the results found at a city level. Nevertheless, CI industry is a highly decentralized market: the vast majority of CI firms are small, powerless, and do not subject to governmental regulation, the evolution of the industry is less likely to be affected by variances in policies of different areas. Furthermore, given the dominant position Shenzhen holds in the industry, findings in this thesis can still be seen as an indicator for the overall organizational dynamics of CI business in China as a whole.

1.2 Major Theoretical Issues

The bulk of this thesis seeks to address the following theoretical issues in the framework of organizational ecology: (1) revisiting density-dependence theory in a fuzzy construction, (2) competition dynamics of organizations, and (3) emergence of organizational forms.

(1) *Revisiting density-dependence theory in a fuzzy-set construction.* The density-dependence theory which was advanced by Hannan and Carroll (1992) predicts that in the formative years of a population, low-level increases of density drives legitimacy more than competition, while the opposite occurs when density

increases at high levels. The predictions of the well-known theory have been confirmed in numerous empirical studies. However, the theory has rarely been tested in a fuzzy context in which organizations often differ in grade of memberships, and can belong to more than one population (but see Negro, Hannan et al. 2008; Kuilman and Li 2009). Testing the standard theory in a new setup opens the door for theory development and reconceptualization.

(2) *Fates of organizations with a varying degree of grade of membership (GoM)*. The fates/effects of new start-up entrants (*de novo*) and pre-existing producers (*de alio*) have remained one of the research focuses among organizational theorists (Carroll, Lyda et al. 1996; McKendrick, Jaffee et al. 2003; Perretti, Negro et al. 2008). With the recently developed fuzzy-set theory, this thesis attempts to examine the fates of *de novo* and *de alio* firms in a new light. *De novo* firms in such context can be viewed as members with higher GoM, while *de alio* firms are equivalent to members with lower GoM.[3] Do higher-GoM members live longer than those with lower GoM? Or is it the other way around? Received ecological theory claims that higher-GoM organizations tend to experience a lesser degree of competitive pressure than those with lower GoM, thanks to their higher level of intrinsic appeal (Hannan, Pólos et al. 2007). The theory, however, appears to be problematic when it comes to a young organizational population, especially when it is at its initial stage, because organizations' grades of membership are unlikely to be developed in that context. So how does the mechanism of competition operate in a fuzzy setup when GoM is not applicable? This thesis will address these issues.

(3) *Emergence of organizational forms*. The historical emergence and establishment of new organizational forms has always been a central concern for classical works in economics (Schumpeter 1934), sociology (Weber 1968), and organizational ecology (Hannan and Freeman 1977; 1989). Despite considerable interests in the area, organizational theorists have yet to produce a generalizable model explaining form emergence (see Romanelli 1991; Ruef 2000). Most of the previous studies working on this area follow density-

[3] Note that such analogy is only valid when the population is at its initial stage of operation. As the population ages, a de novo firm may possess low GoM whereas a de alio firm may become focused.

dependence theory (or a reformulated specification of the theory) to examine development of organizational forms. However, the theory is criticized by some neo-institutionalists for not having the details of the legitimation process specified (Zucker 1989; Baum and Powell 1995). The recently developed contrast-dependence theory (Hannan, Pólos et al. 2007) seems to rectify the problem. It takes into account the perceptions of social actors with regard to the underlying blueprint of the population, and claims that legitimation level of the population increases monotonically with its average contrast (or consensus level). This thesis follows the contrast-dependence theory in the study of form emergence in CI population. I found that the underlying mechanism of legitimation is more delicate than predicted by the theory.

1.3 A Reader's Guide

The main body of this thesis consists of three empirical chapters. Each has a different focus on theoretical issues and is constructed in a relatively independent manner. Specifically, the following chapters are structured as follows:

Chapter 2 outlines the historical background of the population under study. The chapter briefly reviews the evolution of the corporate identity concept and the development of the associated industry worldwide, before going in detail to the growth of the industry in China as a whole, and finally to Shenzhen, the city under observation. The chapter can be seen as essential reading, since it gives a detailed account of how the CI concept evolves over time, which has an important bearing in theories development in following chapters.

Chapter 3 explains the fuzzy construction of the whole population and relevant methodological issues. In order to preserve the readability of the thesis, most of the methodologies used in the thesis are discussed in this chapter. For readers who are not interested in these technical details, skipping the methodological parts should not be problematic since I have made the three empirical chapters relatively self-contained. Nevertheless, the remaining parts in Chapter 3 are worth reading (especially section

3.1 and 3.2), since they explain in details the construction process of a fuzzy CI population, which is the core concept that runs throughout the thesis.

Chapter 4 is the first empirical chapter which aims to address the CI blueprint as a whole. Specifically, it investigates failure rate of the whole population and compares survival chances of organizations with varying degrees of grade of membership. Chapter 5 narrows down the observation window and focuses only on CI population (a subset of the whole population under study). In particular, it examines the underlying mechanism that affects formation of a CI form in Shenzhen. The chapter builds on methodologies outlined in section 3.3 and 3.4 of Chapter 3.

Chapter 6 is the concluding chapter of the thesis. It summarizes findings from three empirical chapters and comments on their generalizability in other empirical settings. It concludes with a discussion of possible directions of future research, especially in the field of fuzzy-set theory.

Chapter Two

Corporate Identity Consultancy in Shenzhen, 1991 - 2007

The aim of this chapter is to provide a brief review of the industry under observation – corporate identity (CI) consultancy. CI consultancy is a nascent market in the consulting business. There are rich literatures developed in the domain of corporate identity over last two decades. I will first discuss the evolution process of the concept and the associated industry worldwide, followed by a brief review of the industry in Shenzhen. Since the changing patterns of the concept fundamentally shape diversity of the industry today, this chapter therefore can be viewed as the grounds for theories development in following chapters.

2.1 The Evolution of the Concept

The concept of corporate identity, or in a much broader sense, business identity, has attracted a burgeoning interest among academic communities and business circles since the last decade. The rapid ascendancy of the identity concept is reflected in a growing number of books and academic journals which dedicated in the area (Dowling 1994; Olins 1995; Balmer 1998; Cheney and Christensen 1999), and the emergence of related courses. A number of leading business schools around the world began to offer business identity studies as part of their degree courses, including Harvard Business School (USA), Cranfield University (UK), Queensland University of Technology (Australia), etc. Despite the salience of the identity concept, however, both academics and practitioners often find the concept elusive and hard to define (Balmer 2001).

In fact, there is neither a universally accepted definition of corporate identity (CI), nor the specific elements constituting the CI construct (Wilkinson and Balmer 1996; van Riel and Balmer 1997; Melewar and Harrold 2000). The lack of consensus on the

concept can be found from the muddled use of terminology. There is a wealth of other concepts closely associated with the corporate identity domain in literature: corporate brand, corporate communication, corporate image, corporate personality, corporate reputation, and corporate design (Balmer 2001; Christensen and Askegaard 2001; Melewar, Karaosmanoglu et al. 2005). Again there is no consensus as to the precise meaning of the concepts articulated or the relationships between them (Olins 1979; Abratt 1989). The fact that these concepts are closely linked and are sometimes used interchangeably makes the CI concept even more confusing and looks enveloped in the "fog" (Balmer 2001). Not surprisingly, the International Corporate Identity Group (ICIG) decided not to give a definition for the concept but rather a so called "Strathclyde Statement" which articulates the multidisciplinary nature of the area (van Riel and Balmer 1997). The Statement can be found in Appendix 2.

In order to understand the "fog" surrounding corporate identity, one must trace back to the provenance of the concept. Corporate identity has its roots in graphic design. Originally, corporate identity was synonymous with organizational nomenclature, logos, company house-style and visual identification (van Riel and Balmer 1997). It is believed that the world's first corporate image was created by Peter Behrens (an eminent German architect), when he was hired as architect and product designer by Emil Rathenau's A.E.G. in Berlin in 1907. This marked the emergence of corporate identity. However, it is the Americans who drove the movement of corporate identity. The most commonly cited figure in corporate identity is Paul Rand, who designed the striped logo of IBM in 1972. Paul Rand is considered the father of corporate identity and his work has been seminal in launching this field. CI at this early stage was narrowly conceived as symbolism and visual identification of the organization.

CI was later assigned a greater role and had grown from its original purpose of increasing organizational visibility to a position where it is seen as having a role in communicating corporate strategy (Olins 1978; van Riel and Balmer 1997). Since then CI was regarded as a strategic resource for building credibility and support amongst a variety of audiences (Downey 1987). Simultaneously, other concepts were introduced into the CI mix: corporate philosophy, culture, core values reflected in its mission and vision statements (Bernstein 1984; Abratt 1989), whereas others tended to perceive

corporate identity as a integrated corporate communication paradigm (van Riel and Balmer 1997).

Today the understanding of corporate identity has been much broadened since its introduction. Many scholars and practitioners now take a multidisciplinary approach and share the view that an organization's identity is revealed through behaviour, communications, as well as through symbolism to internal and external audiences (Olins 1989; van Riel and Balmer 1997). In Melewar (2003)'s view, however, corporate identity has a more complex structure. He proposed seven components of CI: corporate communication, corporate design, corporate culture, behaviour, corporate structure, industry identity, and corporate strategy. Recently, the CI concept has been seen as the composite of all expressions of an organization (Steidl and Emory 1997; van Riel and Balmer 1997; Balmer and Gray 1999).

It is evident from above that the concept of corporate identity is evolving, as is the relationship between the associated concepts. Corporate identity was under the paradigm of graphic design at the onset, it is however today perceived as a concept omnipresent in literature and containing a number of elements. Regardless of the ambiguity of the concept, many scholars agree that corporate identity consists of "*the set of meanings by which a company allows itself to be known and through which it allows people to describe, remember and relate to it*" (Olins 1989; Markwick and Fill 1997; Melewar and Saunders 1999). While inadequate as a definition, corporate identity can be understood as the "*...summation of those tangible and intangible elements that make any corporate entity distinct… It is multidisciplinary in scope and is a melding of strategy, structure, communication and culture.*"(Balmer 2001)

Given the definition above, many scholars conclude that the management of an organization's identity is of strategic importance. There is evidence to support the notion that a well managed corporate identity can help an organization establish a favourable reputation, which in turn will be translated into a competitive advantage for the organization (Fombrun and Shanley 1990; Schmidt 1995). All of these give corporate identity consultancies significant opportunities to grow. In fact, the management of corporate identity programmes are now in place in many large organizations in the private as well as public sector.

2.2 Corporate Identity in Practice

In practice, corporate identity consultants generally refer to firms that seek to build and maintain a strong corporate/brand image for their clients by the means of formulation of a clear visual identity (e.g., corporate title, logo, letterhead, business cards, etc.) and articulation of corresponding strategic identity (e.g., mission statement, values, and organization structure). Every organization is said to have an identity – either formal or informal. The question is whether an organization can manage its identity in the most effective and purposeful manner possible, and that is exactly the reason of being for CI consultants. The fundamental idea behind a CI programme is that everything the organization does and owns should reflect the organization and its goals in a consistent and positive manner.

Even though corporate identity consultancy originated in the U.S., and later spread to Europe, few markets, if any, were as developed as Japan. The CI movement took root in Japan in the late 1960s and came into full bloom in the 1980s. The most notable CI consultant cited in business is the COCOMAS committee, and company PAOS, both founded by Motoo Nakanishi[4] in Tokyo, Japan in 1968. The success of PAOS significantly influenced the development of CI in other Asia nations, especially in Taiwan and China. Japanese CI companies perform functions that are rarely done together by other industries (Thomas 1999). In particular, they fuse aesthetic design, strategy consulting and corporate culture to reinvent the desired corporate identity for clients. In the 1990s, however, the appeal of CI was waning, partly due to the overall downturn of Japanese economic conditions in that period. As a result, some CI companies began to seek other growth alternatives in neighbouring countries, especially in Taiwan, South Korea, and China.

The CI industry in western nations had a somewhat different picture. The CI movement began in the US and Europe in the 1950s and 1960s, respectively. At this stage, much attention of CI firms was focused on the concept of “corporate image”, that is, corporate name or logo changes. Starting from the 1970s, with the increasing emphasis on the consistency of an organisation’s looks, behaviour, communication,

[4] Motoo Nakanishi is widely considered as the “father” of CI movement in Asia in Chinese literature.

and strategy, many CI companies began to shift their focus from corporate looks to identity. Consistent with the evolution of the concept, they believed that consistency in the way the identity is expressed is of paramount importance to the organization. CI companies in this stage are most similar to their Japanese counterparts. In the mid 1990s, however, the focus of CI companies shifted again. They became aware that brand could be used not only for product, but for the corporation as a whole. Consequently, reference to the "corporate brand", or what is sometimes termed "service branding" (cf. Balmer 1995; de Chernatony 1999), has replaced reference to "corporate identity". Brand consultancies began to sprout across the US and Europe. A notable case is Wolff Olins, it was termed as Europe's largest corporate identity consultancy eight years ago, today it swiftly positions itself as "the world's most influential brand business" (Olins 2009). The vagaries in fashion in the use of concepts reflect the evolution trajectory of corporate identity, at the same time however, it also marks the vagueness and ambiguity of the population.

2.3 A Brief Review of CI Consultancy in China

The concept of CI was initially introduced into China by some arts and crafts colleges at the beginning of the 1980s. Being an exotic notion, corporate identity was originally translated into "Qi Ye She Bie", which is the exact meaning of "corporate identity" in Chinese. However, this terminology never became popular in business circles. Instead, "corporate image", or "Qi Ye Xing Xiang" in Chinese, was quickly used as a substitute. Many academics and practitioners are quick to point out the fundamental difference between the two closely associated concepts (Wang 2000; Christensen and Askegaard 2001; Mei 2002; Zhang and Wu 2004). Corporate identity generally asks the question of "who/what are we", and it tends to address a series of questions including business philosophy, strategy, structure, etc., while corporate image usually asks the question of "what is our current perception and profile", it refers to the immediate mental perception of the organization held by external audiences (Balmer 2001). However, due to the elusive nature of the identity notion, people in China often find it problematic to precisely capture the connotation of the concept in a business sense. Image, in comparison to identity, is much clearer and easier to understand, plus the fact

that it is not far from the identity concept, it was therefore quickly accepted by CI practitioners as a substitute, albeit reluctantly. This led to an interesting dilemma. Despite all the efforts to differentiate identity from image, CI enthusiasts often find it hard to disassociate with the image notion. On the one hand, they are eager to explain to clients the fundamental difference between corporate identity and corporate image. On the other hand, they call themselves "corporate image consultants". Even though the concept of CI was accompanied by confusion from the first day it entered China, this did not stop it from getting increasingly popular in a relatively short time.

It became a hit after a small design firm created a logo and a set of identities for Apollo Group[5] in August 1988. It was documented as the first company in China embracing the CI concept. The introduction of the CI system into the basically unknown company brought it a magical economic return. Its sales revenue increased almost 20 times in just five years, rocketing from 7.5 million RMB in 1988 to 1.3 billion in 1993, a scale which is largely unprecedented in China's recent business history. Apollo Group quickly became one of the top conglomerates in China. The case was marked as the formal start of CI fever in China. Stimulated by the success of Apollo group, other businesses rushed into adopting the practice of corporate identity, though few of them knew exactly what was meant by CI.

The business of CI came into bloom in the 1990s, when hundreds of CI companies developed over night. In this emergent stage, the CI movement in China was significantly influenced by Japan and Taiwan's managerial expertise. The most frequently cited CI mix in China came from Japan, namely, mind identity (MI), behaviour identity (BI), and visual identity (VI)[6]. Due to a lack of consensus on the concept, however, the market is characterized by disorder and elusiveness. Each company has its own interpretation of CI, and many of the CI programmes undertaken were implemented with poor quality. As a result, the appeal for CI was waning in the late 1990s. In the beginning of the 2000s, some leading CI companies shifted their focus and entered the governmental sector. Such businesses typically involved in the

[5] A company locates in Guangdong that specializes in producing health-care drinks.
[6] The CI mix was introduced by PAOS (Progressive Artists Open System), an influential CI company based in Japan.

construction of the country's overall image[7], or in a smaller scale, the reinvention of a city's or province's image. The number of CI firms slightly grew in this period and reached another peak in 2003, which was called "the second golden age" of CI (Zhang 2005), and was hailed by some CI enthusiasts as a symbol of a mature and established CI market. However, the second blossom did not last any longer, the fever for CI quickly wore off in 2004 and never pick up again.

There are two major industry associations currently available in China. Established in Beijing in April 1996, Chinese Council of Corporate Image Consulting Institute represents the first authoritative association responsible for the regulation and management of the emergent industry. Its main motivation is to reduce the "vagueness" of the industry caused by CI companies, and facilitate the development of the market. In April 2004, another association - the CI Promotion Commission of China (CPCC) - was jointly formed by State-owned Assets Supervision Commission[8] and a leading CI consultancy based in Guangdong, aiming at CI promotion and training in China. It is worth noting that both of the associations are still in their infancy, their influence on individual companies or the market as a whole is negligible (only a limited number of CI companies joined them). In addition to their role as governmental bodies, the two associations also act as commercial units, competing with other CI companies in the same market, which again weaken their managerial authority on the industry. Nevertheless, the formation of two industry associations signalled the appearance of a somewhat regulated and established CI market.

2.4 Ups and Downs of CI Firms in Shenzhen

Located in Guangdong province, Shenzhen is regarded as the centre of CI business. It is the most concentrated city in terms of either CI firms or practitioners. Thousands of CI companies converge in this small area, accounting for over a quarter of the industry nationwide. The level of concentration makes CI business highly competitive in Shenzhen, which in turn drives the CI population to evolve faster than other parts of

[7] For example, when China bid for the 2008 Olympic in 1999, they sought help from Chinese Council of Corporate Image Consulting Institutes, which was proved to be a big success.
[8] A governmental department under State Council of China.

the nation. As would be expected from the concept of CI discussed earlier, most CI firms in Shenzhen mainly focus on visual identity designs (e.g. corporate housestyle, brand, logo design, typeface, etc.). In fact, the majority of personnel employed by corporate identity consultancies tend to have a background in graphic design. A small number of firms offer only "intangible" identity consulting (e.g. corporate philosophy, strategy, mission, etc.), while others fuse both tangible and intangible identity consulting services like their Japanese counterparts (see PAOS), though the number is even smaller.

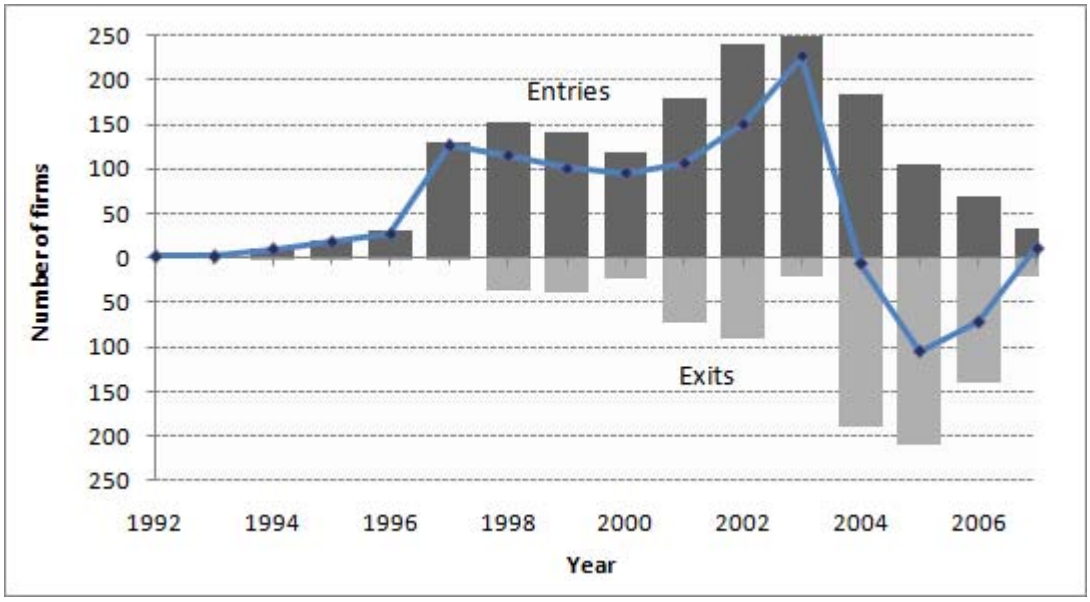
CI firms in Shenzhen generally follow the development trend of the country. Three years after the success story of Apollo Group, a powerful industrial corporation entered the CI business in January 1991, which signifies the birth of the business in the city. Strictly speaking, the industrial corporation at the time was not regarded as a CI firm, since CI consultancy is just one of many lines of business engaged by the company. One year later, in June 1992 the industrial corporation decided to set up a subsidiary company that focused only on CI business (probably due to the success of the business in its parent company). The subsidiary carried a distinct CI label in its company name, and is believed to be the first CI firm in Shenzhen.

In the following four years, the number of CI firms grew consistently, but in a very slow manner. 1997 was the turning point for CI firms in Shenzhen, as the number of firms rocketed from dozens in 1996, to hundreds in 1997 (see Figure 2.1). The sudden hit of CI fever coincided with the establishment of the first industry association in the country - Chinese Council of Corporate Image Consulting Institute, which was founded in 1996. 1997 can be interpreted as the year in which the notion of CI was gradually accepted by audiences, it signals the birth of a somewhat established CI market in Shenzhen.

The period between 1997 and 1999 is termed as the "first golden age of CI" in Shenzhen (Zhang 2005). A huge demand of CI services by that time drove the consulting fees to a historical high. CI firms could easily charge a million RMB for a single consulting contract. The highest price ever documented was charged by Icon Image Ltd. – an influential CI consultant nationwide, at a price of 3.8 million RMB in 1998. Such a price was really rare given that the consulting industry was still in its

infancy in the late 1990s in China. The fanaticism of CI in its early history is partly due to increasingly intense competition among businesses when China took further steps in its reform and opening door policy. Firms were desperate to stand out from others and attract audiences' attention, which might in turn increase their chances of survival. Another reason is perhaps the exaggerated efficacy of the CI concept. CI was deemed omnipotent at the beginning. It was widely believed by enthusiasts that it could solve all the problems of a company from outside (creation of a company's "look") to inside (structuring of a company's philosophy) which, of course, quickly turned out to be a bubble that was too good to be true.

Figure 2.1 Number of Entries and Exits of CI Firms in Shenzhen (1992 – 2007)

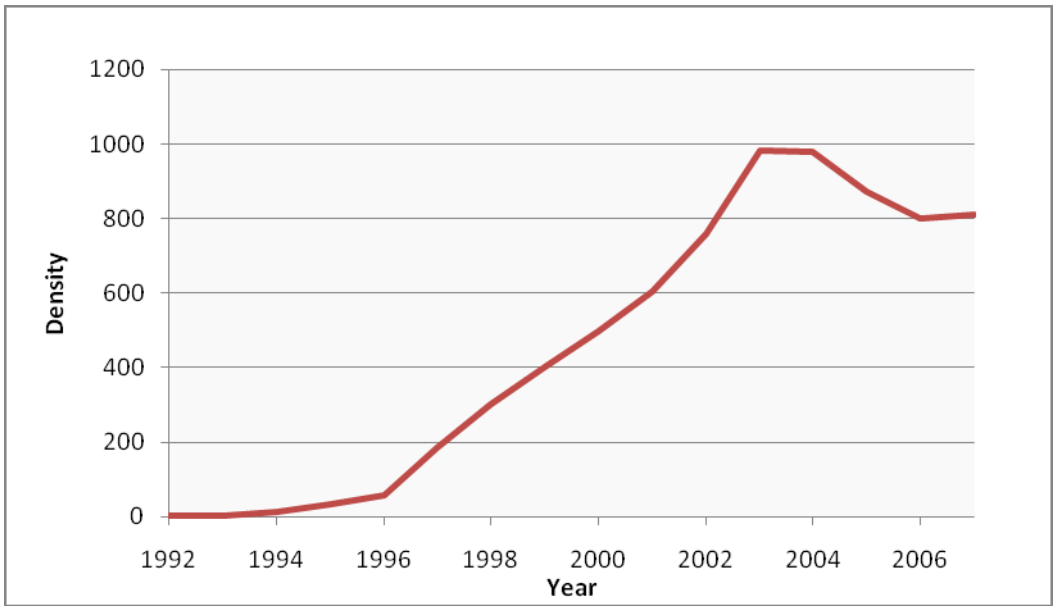


(Note: The number of entries in each year is given by the length of the bar above the x-axis. The number of exits in each year is given by the length of the bar below the x-axis. The solid line shows the annual difference between entries and exits.)

The number of CI firms continued to grow in the following year, but at a decelerated pace, until 2001. The years between 2001 and 2003 were regarded as "the second golden age of CI" in Shenzhen. The number of CI firms grew at an increasing rate and peaked in 2003 with a total of 983 firms – a historical height that has never been attained again (see Figure 2.2). Nevertheless, in this second wave of CI phenomenon, the CI practice never recovered its status that was attained in the late 1990s. Fanaticism of the concept was replaced by rationality as well as criticism. Consulting fees dropped from millions in the late 1990s to mere thousands in 2003 (Mei 2002). Competition

pressure and casualties of CI firms began to mount. Following their western counterparts, some of them began positioning themselves as "corporate brand consultants". The appeal of CI quickly waned after 2003. The entries of CI firms reached a historical low in 2006 (since 1997).

Figure 2.2 Density of CI Firms in Shenzhen (1992-2007)



2.5 Constituents of CI Population

Since the CI concept closely associates with a set of elements, CI firms in Shenzhen are widely in diffuse competition with three populations that also claim to engage in CI consulting business: graphic design, advertising agency, and general management/strategy consultant[9]. Firms in each of these three industries bring a distinct set of skills to bear on CI issues. In particular, CI firms overlaps with graphic designers and advertising agencies for that portion of business that deals with visual identity system, whereas it overlaps with general management consulting firms in the development of "intangible" organizational identities. The three populations look similar to CI firms on that part of CI business in which they engage, and it is not

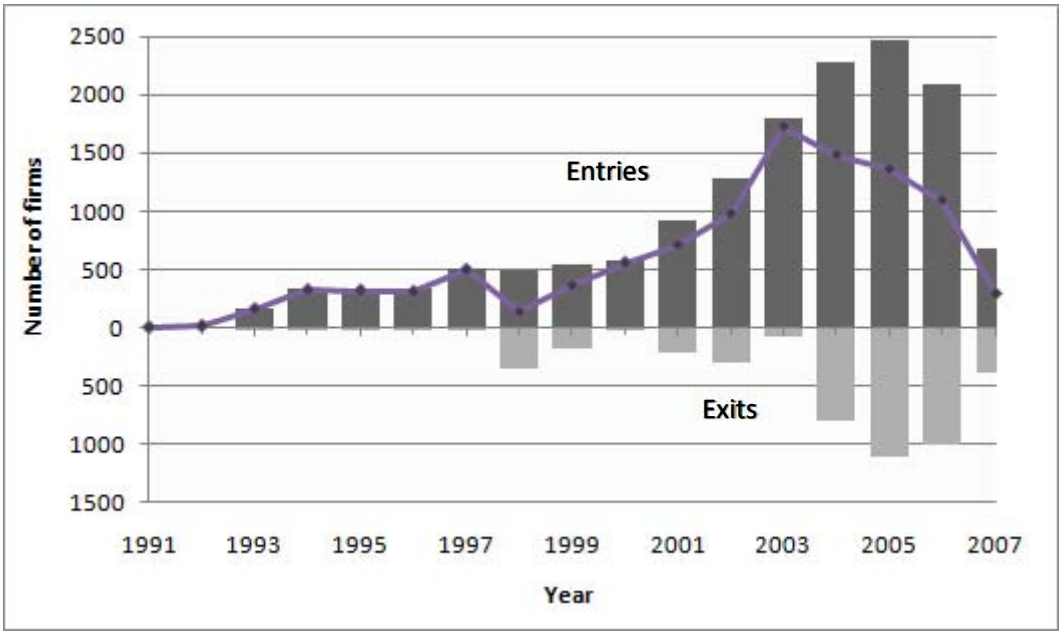
[9] Note that not every firm in the three populations in Shenzhen offers CI business. They entered the picture of study is simply because they claim to engage in CI market. In other words, they might only constitute a small portion of the population where they belong to.

uncommon for people to mistake them for CI companies. For details of differences between CI consultancy and the three associated industries, please refer to Appendix 1. Apart from the three closely intertwined populations, there are a large number of businesses in Shenzhen (nearly ten times that of CI firms) which claim that they also offer CI consulting services. Such companies are greatly diversified and cover a number of relatively unrelated industries, e.g., exhibition agencies, interior design firms, ritual consulting agencies, etc. The "CI" services they offer, however, are quite different from that of CI firms - it is simply because they have different interpretation towards the CI concept. These huge numbers of firms, together with the three subpopulations mentioned earlier (namely, graphic design, advertising agency, management consultancy), are what I call the "*extensional population*". By "*extensional*" I mean such firms stand outside the central population of interest (i.e., CI consultancy) but retain a certain sense of connection. Some closer and some further, but they all share one element in common – offering CI design/consulting as part of the services provided.

The growth of such firms appears to follow a different pattern from that of CI firms (see Figure 2.3). They did not experience any golden age. The number of such companies consistently grew in an accelerated manner (except for 1998 - one year after the return of Hong Kong to China's sovereignty) until 2003, when its growth started to slow down, which roughly coincided with the fashion timeline of the CI concept. The number of *extensional population* peaked in 2007 with a total of 10,350 firms (see Figure 2.4), the lowest growth rate since 1998.

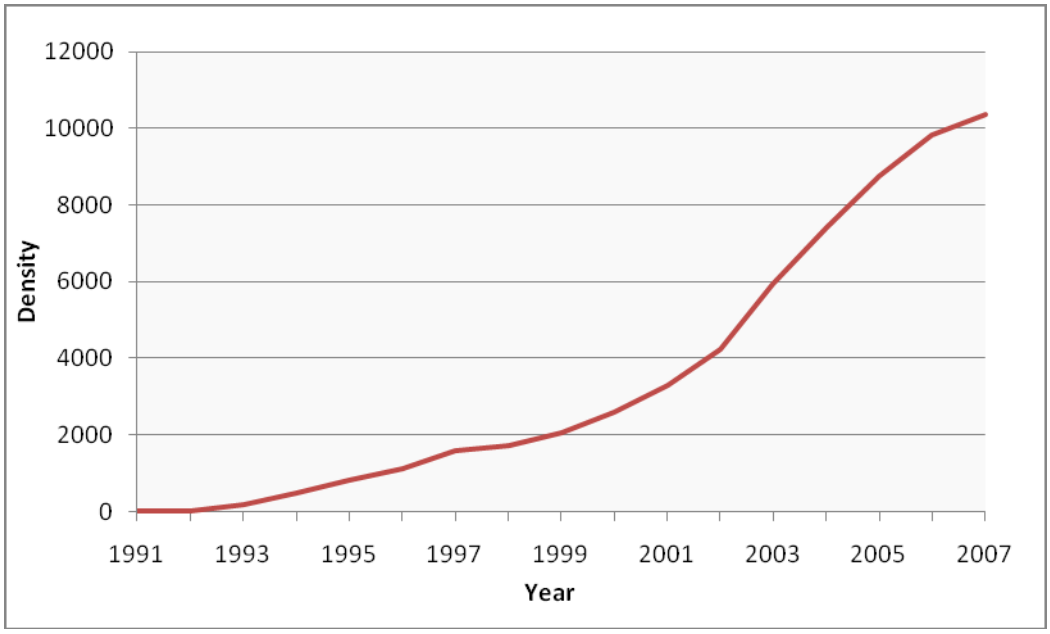
In general, the vast majority of the *extensional population* did not bring much diffuse competition for traditional CI firms (except the three closely intertwined sub-populations), since they have a fundamentally different target of clients. Although they did not compete for environmental resources explicitly with CI firms, I speculate that the existence of such a population could have a significant impact on the formation of an institutionalized CI form, at least implicitly. As a preliminary argument, such firms muddy the water of the CI market, and make the CI concept even more confusing in the eyes of relevant audiences. The underlying mechanism of interaction between *CI population* and *extensional population* will be further discussed in following chapters.

Figure 2.3 Number of Entries and Exits of Extensional Population in Shenzhen (1991 – 2007)



(Note: The number of entries in each year is given by the length of the bar above the x-axis. The number of exits in each year is given by the length of the bar below the x-axis. The solid line shows the annual difference between entries and exits.)

Figure 2.4 Density of Extensional Population in Shenzhen (1991-2007)



2.6 Categorical Status of CI Population

As explained earlier, there is little consensus that existed towards the label of CI consultancy, so is the corresponding population. By fusing aesthetic design and strategy consulting together, CI firms in China tried hard to establish themselves as a distinctively new industry, but with little success. In the eyes of relevant audiences, CI consultancy is just another synonym of graphic design. Disagreement can often be found in functions and connotation of the CI label. Questions such as "who are they" and "what is it" confuse not only external audiences, but also in some cases CI firms themselves. Here is one example, a CI firm in its website claims that "…we are one of the influential CI consultants in the graphic design industry…" (Li 2008), though it names itself as "corporate identity consultancy".

Extensive interviews with a variety of industry insiders showed that similar discords are widespread in the business circle. As the manager of one influential CI firm noted, "…the main problem with the industry is its ambitions…the ambitions of trying to fuse too many elements into the concept…the ambitions that are far beyond its own capabilities." When prompted to give a definition of the business, not surprisingly, the answers they gave were diverse. The component of the industry could be visual identity design, or the one that integrates image design with one or more of the following activities: strategy management, marketing, advertising, public relations, culture management, or interior design (CI Consulting Institute 1996).

The lack of agreement on the intensional understanding of CI consultancy is also reflected in the industry classification in China. As can be expected from the concept, some industry directories regard CI consultancy as a specialist in graphic design, while Yellow Pages treat it as a subcategory of the advertising industry. In governmental sources, such as local department of Companies Registry, the classification for the industry is even more chaotic. In a few instances, some CI firms are classified under the category of advertisement. However, in most cases CI firms in registry are categorized as "unspecified businesses" under the parent industry of "Business Services" which covers a wide range of business consulting services, such as law consulting, investment consulting, advertising agency, etc. The lack of consensus for

the meaning CI consultancy makes it clear that the category is likely to be not yet fully established or, in more formal language, it is not cognitively legitimated (Meyer and Rowan 1977). Cognitive legitimation, as will be discussed in depth in Chapter 5, refers to a more subtle process of gaining the standing of a taken-for-granted element in a social structure (Hannan 2005). In their recent book, Hannan et al. (2007) suggest a distinction between a category and a form. Generally speaking, a category is a concept about whose meaning audiences have reached a high level of intensional consensus, whereas a form is a highly legitimated category. In this thesis I follow their differentiation of the terms. Given the low level of agreement on the meaning of the concept, CI consultancy in China is unlikely a fully established category, let alone a legitimated form. Concepts of form and legitimation will be addressed in depth in following chapters.

Chapter Three

Data and Methods

This chapter describes the source of data and research methods used in this thesis. It starts by explaining how the CI population is defined in a fuzzy manner, followed by definition of entry and exit of firms in the population. The new construction of the population and density measures paves the way for theory developments in following chapters. This chapter also discusses in depth two statistical methods employed in data analysis: event count and event history models. It concludes with methods used in model estimation and evaluation.

3.1 Data Sources

The primary source of data for the life histories of CI population in Shenzhen comes from Shenzhen Administration for Industry and Commerce (hereafter SZAIC). SZAIC is a local government body responsible for regulating and supervising market/business in Shenzhen. Every single enterprise in China – public or private, large or small, is required by law to register with local Administration for Industry and Commerce (hereafter AIC). In addition to initial registration, enterprises must also report to AIC in case of name changes, lines of business changes, legal person changes, or other major legal changes. Every year at a specified period of time, all companies must file annual reports with the local AIC. Failure to do so may result in serious sanctions, such as revoke of licence. Therefore, the database of Shenzhen AIC represents one of the most comprehensive and highest-quality information on corporate demography available in the city. The data cover the entire history of CI movement in Shenzhen from its inception in January 1991 until May 2007, and include information on virtually every known CI firm. In order to build the database, additional sources such

as industrial publications, China CI almanac (Zhang 2005) , annual reports, library, and internet are also consulted.

Population Construction

There are two main obstacles in this study in defining a meaningful population. First of all, as would be expected, CI consultancy in China is not yet a categorized population, which means a meaningful CI population cannot be grouped by using the industry classification in SZAIC database[10]. Second, the CI concept lacks a sharp boundary. There are a large number of relatively unrelated businesses which closely intertwined with CI consultants. Although they are categorically different from CI firms, they have significant potential in shaping the evolution of the CI population, hence ignoring these firms would undoubtedly result in a seriously biased sample population.

Fortunately, two features in Chinese businesses make the extraction of a meaningful CI population possible. First of all, firms in China are required by law to include the prime business or industry which they intend to enter as part of their corporate names when they register with local AIC. For example, the Regulation and Governance of Corporate Names states that: "…corporate name should include words that reflect the industry or business which the company intend to engage…the signification of the words should be in line with ranges of business reported by the company…" (rule 16th under Chapter 2, SZAIC 1991)[11]. If, however, a firm is a conglomerate that engages in a variety of different businesses, in such case it will include the words of "Group limited" or "Industrial Corporation limited", which is practically easy to identify either[12]. In other words, based on the name of a company we can usually tell the property of its business, which is practically unimaginable in Western nations. (In Western countries, corporate names are usually obscure. For example, it would be hard to guess that Wolff Olins Limited is the name of an influential brand consultancy in Europe). This feature makes it possible to group all the CI firms into a category.

[10] CI firms are usually classified as "Unspecified Business" in SZAIC database.
[11] Here are some examples of typical company name in China: Power Corporate Image Consulting Ltd, Asia-Pacific Corporate Image Consulting Ltd, Dabing Advertising Ltd, Baolong Health Drinks Ltd, etc.
[12] An examination of the dataset reviews that such conglomerates constitute a tiny minority of the whole population.

Secondly, when companies register with local AIC, they must report their lines of offerings, as detailed as possible. Misleading or deceptive information in such area may not meet with immediate sanctions; however, it has two potential negative impacts. First, when they file annual reports, there is a possibility that they will be caught by AIC for violation of the specified rules and regulations, which may result in a certain amount of penalty. Second, company data of all firms in AIC including lines of business offered are publicly available. Audiences rely on such information to identify and approach firms of interest. Deceptive information in such areas may bring them no benefit but make them unapproachable for potential clients, and loss of credibility. Therefore it is reasonable to assume that the ranges of services reported by firms in the SZAIC database are in most cases accurate[13]. This feature makes it possible to extract a sensible CI population from the SZAIC database, even though the concept lacks a sharp boundary.

With these two Chinese-specific features in business, I constructed the CI population in Shenzhen in two steps, based on searches of keywords. The keywords used include both English and Chinese terms of corporate identity and all of its possible substitutes that can be found in literature[14], and any possible typos in Chinese characters (e.g., 形象 was sometimes mistyped as 形像). The initial list of CI firms[15] was constructed by searching these keywords in corporate names in the SZAIC database online, which led to a total of 1,663 firms that carry, or ever carried, the label of CI in their names. Next, I turned to the bigger population. By using the same keywords I searched lines of business offered by firms in the database, which resulted in a total of 16,432 firms that include, or ever included, CI as part of services offered. Of course, the vast majority of CI firms identified in the first step (over 99%) overlap with this bigger population, but not all of them, since not every CI firm includes CI in their lines of service (it seems reasonable since their names tell everything). It is worth noting that the keyword of "corporate image" (or "qi ye xing xiang", in Chinese) fully dominates other label substitutes, either in search of corporate names or search of services offered. In either

[13] Of course, there are exceptions. Whenever necessary, I would contact firms in question to make sure the range of services they provided is correct.
[14] These include: "CI", "corporate identity", "qi ye she bie" (the Chinese translation of "corporate identity"), "corporate image", and "qi ye xing xiang" (the Chinese translation of "corporate image").
[15] Note that the notion of "CI firms" thereafter refers to firms that carry CI label in corporate names, unless otherwise specified.

case, the return of the search for the label constitutes over 99% of the overall population. In other words, the usage of other label substitutes never became popular in the CI history in Shenzhen. In fact, they virtually played no role in the evolution of the industry.

Combining these two sets of data I get a complete set of population consisting of a total of 16,450 firms[16], in which 1,663 firms carry CI label in their names and 14,787 firms do not. The former is what I called "*CI population*"[17] and is regarded as the "authentic" population of CI, that is, they are perceptually focused in providing CI consulting service. The latter is what I called "*extensional population*" which consists of firms that are more or less relevant in terms of CI consulting. Using the classification method mentioned earlier (i.e., searching keywords in corporate names), I further identified 58 categories of firms out of the extensional population (a full list of 59 categories – CI category plus 58 categories in the extensional population, can be found in Appendix 3). As one can imagine, some of them are very close to CI population in terms of business nature, such as graphic designers, advertising agencies, etc. Some of them, however, are very dissimilar to CI firms, e.g., investment consulting agencies, etiquette consulting firms, real estate agencies, etc.

It is worth noting that my way of defining a population significantly differs from all previous organizational studies. Rather than treating organizational population as a crisp set, the new measure of defining a population allows population boundaries to become fuzzy, which is deemed as more realistic in the organizational world (Hannan et al., 2007). The fuzzy-set concept is the mainstay of the thesis and runs through all chapters. It will be discussed in depth in Chapter 4.

3.2 Entry and Exit of Firms

In empirical studies, researchers typically rely on the state of a firm's presence in a population of interest to determine its business status. That is, the date of entering or

[16] The data is accurate on 22nd May, 2007.
[17] Note that the notion of "CI population" thereafter refers to the population in which firms carry CI label in corporate names, unless otherwise specified.

leaving a population is coded as the firm's entry or exit date, respectively. This does not pose any problems in traditional studies, since researchers without exception all follow classical rules in defining an organizational population. The state of presence in a business is unambiguous – a firm is either in the population or not in the population at all. In the fuzzy-set context, however, the classical approach in determining a firm's business status appears to be problematic. For instance, if a CI firm leaves the CI population and enters another industry, but claims that it still offers CI service in the new industry entered, how should we define its business status in terms of CI consulting? The classical approach would deem it failed in the CI business, since it is no longer a member of the category. The fuzzy approach, however, would hold a conclusion to the contrary, because the firm is still active in the business even when it leaves the CI category. I argue that both approaches have their merits in empirical studies, which one to choose obviously depends on the context of theory development.

In this thesis I employ both of the approaches in defining a firm's entry and exit date, upon which two sets of density measure are constructed: population density and category density. Population density measures density of firms in the entire population using fuzzy approach. In empirical assessment, a firm's enter-date is recorded from the date when it includes CI as part of services offered. If a firm provides CI service in the first date of starting up business, then the enter-date of the firm is tantamount to its registered date in SZAIC database. In terms of ending dates, two types of ending event are relevant here: disbanding, and leaving CI business. Disbanding is easy to interpret: it means the firm failed as a collective actor. Leaving CI business, however, needs to be further clarified. Recall that we have two subpopulations: CI population and extensional population. Leaving CI business is unambiguous for firms in the extensional population: a firm dropping CI from its services offered means it leaves the CI market. For firms in the CI population, however, the definition is somewhat more restrictive. Formally, a CI firm is defined as leaving CI business only if both of the following conditions are true: dropping CI consulting as part of services offered, and leaving the CI category[18]. If a firm has no changing record, its exit-date (if applied) is equivalent to the deregistered date in SZAIC database.

[18] In theory it is possible that a CI firm drops CI consulting as part of services offered, but still keeps the CI label in its company name (i.e., remains in the CI category). If such situation happened, however, I do not believe the firm left the industry, since the presence of the CI label in the company name carries

On the other hand, category density focuses on density of firms within each category. It uses classical approach to classify firms among different categories, but still lies in the framework of fuzzy-set construction. In assessment of a firm's entry and exit date, the situation is slightly more complicated than the scenario discussed above. As for the CI category, a firm's enter-date is recorded from the date it starts carrying the label of "corporate identity" in its corporate name. In terms of ending date, two types of ending event matter here: disbanding, and exit to another industry (rather than leaving CI business). The two events are treated alike in the measure of category density. If a CI firm has no changing record, then its exit-date is equivalent to the deregistered date (if applied) in the SZAIC database. As for categories in the extensional population, a firm's first date of providing CI consulting service signifies its entry into the category. With regard to ending events, a firm is regarded as exiting the category if one of the following conditions is met: (1) disbanding, (2) leaving CI business, or (3) exit to another industry. It is worth noting that exit to another industry in such a scenario simply indicates that the firm is no longer a member of the former category, it does not necessarily mean that it fails in the CI business.

I think the fuzzy approaches of recording a firm's enter and exit date makes sense at least in two aspects. First of all, as services offered in many companies in Shenzhen constantly keep changing over their lifetime, capturing such changing processes would certainly contribute to a better understanding of the evolution of a certain concept, which in turn can help us understand the dynamics of a population. Secondly, it makes the fashion status of a certain concept measurable, which will have a significant bearing on theory development in following chapters.

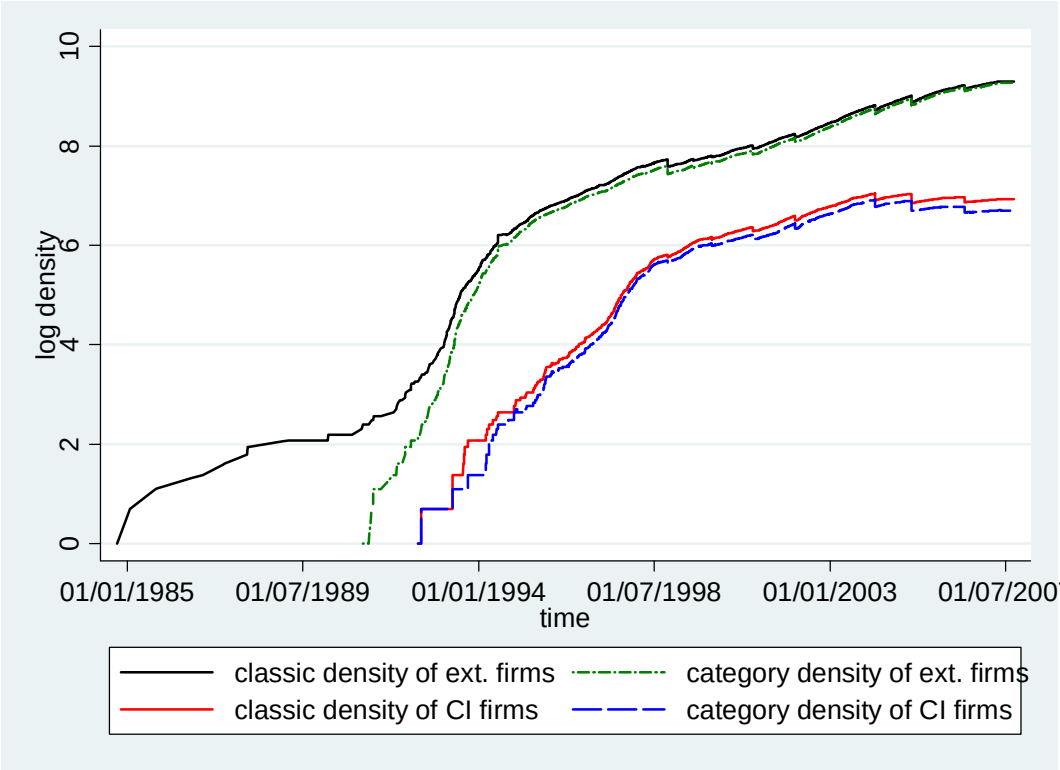
In order to capture the changing pattern of the CI fashion, I further constructed a set of classic densities, in which a firm's entry and exit date are recorded by using its registered and deregistered dates in the SZAIC database[19]. CI is not a matter of consideration here. In other words, a firm may not have any involvement in the CI business when it is recorded in the classic density or, it may leave the CI market long

much more information than in the services offered. Nevertheless, throughout the observation period, such situation has never occurred.

[19] Note that this type of classic density measure is never used in empirical analysis in following chapters, since it violates the basic rules of population density measure. The reason why it is recorded here is that its relationship with category density carries valuable information about the changing pattern of the CI fashion in the market.

before it is marked as exit. By comparing classic density and category density (which is measured by using methods explained earlier) in the two subpopulations (namely, CI population and extensional population), I obtained the following four sets of log densities (Figure 3.1):

Figure 3.1 Four Sets of Log Densities (1984 – 2007)



The relative distance (it is "relative" since the densities are logged) between classic and category density reveals important information about the fashion status of the CI label. A closer distance means that there are increasing numbers of firms in the market that include CI as part of services offered, or carry CI label in their names. A widening distance indicates a situation to the contrary. That is, more and more firms drop CI out of their services offered or their company names, which suggests the CI label is increasingly out of fashion[20]. It can be seen from Figure 3.1 that the relative distance

[20] Of course, dropping CI label out of company names does not necessarily indicate the label is out of fashion. As we know, a firm can grow and be diversified at a later stage of life. Theoretically, a firm can still have a prominent share in the CI market even it enters another industry. However, a careful examination of the data and search of internet reveal that many CI firms that leave the CI category exit the market completely. If they still offer CI service in the new industry entered, the service is marginalized and become insignificant in their services offered, which correspond to my earlier speculation – if a firm drops CI label out of its company names, it lost its passion in the business.

between classic and category density in extensional population is consistently getting smaller and smaller. By the end of the observation window, they are almost overlapped, whereas the opposite is true for the other pair of densities in CI population, whose relative distance is increasingly widened. As a preliminary interpretation, it appears that as more and more firms which engage in other business activities enter the CI market, CI firms start to lose their passion in the CI label. In other words, the increasing popularity of CI in the extensional population seems to be strongly associated with the fading fashion of the label in the CI population. The relationship of the pair of populations and the underlying mechanism of the negatively associated CI fashion will be explored in depth in Chapters 4 and 5.

3.3 Analysis of Founding Rates

In Chapter 5, I will analyze the founding rate of CI firms in Shenzhen. Consistent with conventional framework in ecological research, I estimate organizational entry/founding rates by using event-count model. Such an analysis typically makes use of "count data" (Barron 1992), in which the CI population represents the unit at risk of experiencing an event. For this reason, event-count models estimated the effects of population level and environmental variables but not firm-level covariates (McKendrick, Jaffee et al. 2003). In empirical studies, foundings are usually modeled as realizations of continuous-time stochastic process (Hannan 1989a; 1991). The parameter of interest in this process is the arrival rate, defined as the probability of arriving at state (y+1) at time (t+Δt). This rate can be defined as:

$$\lambda_y(t) = \lim_{\Delta t \to 0} \frac{Pr\{Y(t+\Delta t) - Y(t) = 1 \mid Y(t) = y\}}{\Delta t} \qquad (3.1)$$

where $Y(t)$ is the cumulated number of foundings up to time t, $\lambda_y(t)$ is the rate of arriving at state(y+1) at time t, and $Pr\{.\}$ is the probability that an instance of organizational founding will occur during the period Δt. The entry models used in this paper were based on monthly counts of CI firms entering the CI market. Covariates were updated every month.

In count data studies the Poisson model is usually treated as one of the main options in analyzing organizational founding rates (cf. Ranger-Moore, Banaszak-Holl et al. 1991; Freeman and Lomi 1994; Lomi 1995). The Poisson probability for y number of foundings is:

$$Pr\{Y_t = y_t\} = \frac{e^{-\lambda_t \tau}(\lambda_t \tau)^{y_t}}{y_t!} \tag{3.2}$$

The data of CI population obtained from the SZAIC database contains precise timing of firm entries (i.e., the exact day of each event), which means the temporal intervals of aggregation are not the same (e.g., some subjects were followed for ten days, some for a month and some for two months). If the exposure time was neglected, the Poisson regression estimate would be biased, since it assumes all subjects had the same follow up time. Therefore all the subjects were exposed in the model by the waiting time of firm entries. The Poisson probability distribution has the same mean and variance, Var(y) = E(y) = μ. This distribution does not fit well if μ differs across observations (heterogeneity) (Long 1997). The Poisson regression model incorporates observed heterogeneity into the distribution function, the means and variance are typically specified to be:

$$Var(Y_t) = \lambda_t = exp(\beta \mathbf{x}_t) \tag{3.3}$$

where λ_t is the rate of interest and β is a vector of unknown parameters to be estimated. The term $\mathbf{x}_t$ is the data matrix which contains information of the covariates measured at different time points, a set of period effects, and a constant term. The assumption of equal mean and variance in the Poisson regression model, however, often appears to be problematic in empirical studies on organizational foundings. In particular, it has been common to find the variance of event counts exceeds the mean, often by a considerable margin. The condition is commonly called “overdispersion” (Delacroix and Carroll 1983; Carroll and Hannan 1989a). Overdispersion may arise for a number of different reasons, including unobserved heterogeneity and time dependence (cf. Ranger-Moore, Banaszak-Holl et al. 1991; Barron 1992; Swaminathan 1995). Presence of such overdispersion causes estimates of standard errors of parameters to be underestimated, resulting in overstatement of levels of statistical significance (King 1988; Barron 1990).

As an alternative to the Poisson model, negative binomial regression model (NBRM) is commonly used in count data analysis to tackle the problem of overdispersion. NBRM allows the Poisson process to include heterogeneity by relaxing the assumption that the mean and variance are equal. The formation which can be traced back to Greenwood and Yule (1920), is specified as:

$$\lambda_t = exp(\beta \mathbf{x}_t)\varepsilon_t \tag{3.4}$$

where λ_t is the rate of interest, β are effects of covariates $\mathbf{x}_t$, and ε_t is an error term that is assumed to follow a gamma distribution. This assumption allows the variance of the process to differ from the mean (Greene 2004). In this particular model, the variance takes a different form:

$$Var(Y_t) = E(Y_t)[1 + \alpha E(Y_t)] \tag{3.5}$$

It can be seen from the formula that Poisson regression model is a special case of NBRM (when the dispersion parameter α is reduced to zero). If there is no presence of overdispersion, Poisson model is always preferred given that it has less number of parameters. The exploratory analysis of CI population here however, reveals that there is a significant presence of overdispersion in all the cases, suggesting the appropriateness of the negative binomial regression model. Therefore NBRM is adopted in Chapter 4 by using the software package STATA.

3.4 Analysis of Failure Rates

Apart from founding rate, organizational failure rate is another major concern in this thesis. Such a study typically uses event-history modeling as the framework of analysis. In contrast with "event count" studies, event history models estimate the effects of organizational-level covariates, e.g., age, tenure in an industry, and so forth. Event history analysis, also commonly known as survival analysis, duration analysis or hazard modeling, is usually used to study the duration until the occurrence of the event of interest (Allison 1984; Tuma and Hannan 1984). The "event" in event history

represents a change or transition of a subject from one state or condition of interest to another (Box-Steffensmeier and Jones 2004). Event history models focus on the hazard function. A hazard model is a regression model in which the "risk" of experiencing an event at a certain time point is predicted with a set of time-varying covariates. In the domain of organizational ecology, event history analysis is usually used to analyze the likelihood of an organization experiencing a "failure" (i.e., disbanding or exiting to another industry). In fewer cases, it was used to analyze other events of interest. For instance, the transition and profitability rates of foreign banks in Shanghai (Kuilman 2005), and the likelihood of an Initial Public Offering (Stuart and Sorenson 2003).

Two different populations are tested in this thesis: Chapter 4 tests the whole population (i.e., CI population plus extensional population), whereas Chapter 5 focuses on the CI population only. As for the CI population, an event of "failure" is defined as a CI firm transiting to a state in which it ceases to exist, or exits to another industry (i.e., dropping CI label from its company name). In cases of testing the whole population, a failure refers to a state in which the subject disbands, or leaves the CI market (i.e., CI is dropped from its services offered). The dependent variable in the event-history analysis framework is the instantaneous rate of firm failure, which is defined as:

$$r_i(t) = \lim_{\Delta t \to 0} \frac{Pr\{failure\ (t+\Delta t) \mid no\ \ failure\ by\ t\}}{\Delta t} \tag{3.6}$$

where $Pr\{.\}$ is the probability of a firm experiencing failure from the CI market between t+Δt, given that the firm had survived until time t. At this preliminary stage, I do not want to specify a specific parametric model for the failure rates of firms in the CI market, since it could be an artifact of my parameterization, and might not really reflect what is going on in the data. As a widely used strategy, *piecewise exponential* function appears to be a good choice to start with. Piecewise exponential model is a flexible strategy that represents temporal variation in transition rates by breaking the time-axis into time pieces and fits constant rates within segments (Tuma and Hannan 1984; Carroll and Hannan 2000). An advantage to this model is that it makes no assumptions about the shape of the hazard over time – it could be monotonically increasing, decreasing, nonmonotonic, or anything one can imagine (cf. Cox proportional model). As such, piecewise exponential model is sometimes used as a

preliminary step in choosing an appropriate parametric model. Once the shape of the baseline hazard is determined, it is often proved more productive to move to a simple parametric model that captures this particular shape, especially when the baseline hazard displays some kind of regular pattern (e.g., monotonically increasing or decreasing, or rising and then falling). Of course, if the pattern of the duration dependence is too complex and no parametric models capture its shape well, then it does not make sense to try to fit a simple parametric model. Furthermore, Piecewise exponential model can also be used to verify the appropriateness of a chosen parametric specification after it has been modelled. The general class of piecewise exponential model I will estimate has the form:

$$r_i(t) = exp(\alpha_p + \beta \mathbf{x}_{it}) \qquad p = 1, \ldots, \mathrm{P} \tag{3.7}$$

where α_p is a constant coefficient that is associated with the p^{th} time period, β is a vector of coefficients assumed not to vary across time periods, and $\mathbf{x}_{it}$ summarizes time-varying covariates (Blossfeld and Rohwer 1995). Piecewise exponential models were estimated by using the method of maximum likelihood as implemented with a user-defined routine in STATA (Sørensen 1999).

Based on estimates from exploratory analyses, I specified four time pieces for the CI population: $\langle 0,1]$, $\langle 1,2]$, $\langle 2,7]$, and periods longer than 7 years. For the whole population, I split the age scale into seven pieces: $\langle 0,1]$, $\langle 1,2]$, $\langle 2,3]$, $\langle 3,4]$, $\langle 4,7]$, $\langle 7,12]$, and periods longer than 12 years. Results of estimation for the CI population and the whole population can be found in Tables 3.1 and 3.2, respectively. Together with piecewise exponential model, other frequently used parametric models are also estimated, for the purpose of fitting a most appropriate specification for the data. In particular, models that are estimated include:

Gompertz model,

$$r_i(t) = \beta exp(\gamma t) \qquad \beta,\ t > 0 \tag{3.8}$$

Weibull model,

$$r_i(t) = \lambda p(\lambda t)^{p-1} \qquad \lambda,\ p,\ t > 0 \tag{3.9}$$

Log-logistic model,

$$r_i(t) = \frac{\lambda\gamma(\lambda t)^{\gamma-1}}{1+(\lambda t)^{\gamma}} \qquad \lambda, \gamma, t > 0 \tag{3.10}$$

and Log-normal model,

$$r_i(t) = \frac{1}{t} exp[-\frac{(\log t)^2}{2\sigma^2}] * \left\{ \sigma\sqrt{2\pi} - \int_0^t \frac{1}{\omega} \exp[-\frac{(\log \omega)^2}{2\sigma^2}] du \right\}^{-1} \tag{3.11}$$

Table 3.1 Estimates of Alternative Specifications of Age Dependence in the Failure Rates of CI Firms in Shenzhen

	Piecewise exponential	Gompertz	Weibull	Log-logistic	Log-normal
0< *u* <=1	-3.183***				
	(0.123)				
1< *u* <=2	-2.430***				
	(0.089)				
2< *u* <=7	-1.557***				
	(0.040)				
u >7	-2.056***				
	(0.180)				
γ		0.152***		0.511***	
		(0.014)		(0.015)	
p			1.523***		
			(0.042)		
σ					1.021
					(0.256)
Constant		-2.432***	-2.814***	1.566***	1.607***
		(0.058)	(0.077)	(0.025)	(0.031)
Log-likelihood	-1578.14	-1665.55	-1622.32	-1610.89	-1687.50
No. of parameters	4	2	2	2	2
AIC value	3164.28	3335.10	3248.63	3225.78	3379.005

Note: 1. Standard errors in parentheses
2. * significant at 10%; ** significant at 5%; *** significant at 1%
3. *u* refers to age of CI firms, measured in years.

I use Akaike Information Criterion (AIC) to compare the five non-nested models (Akaike 1974). AIC is a widely used criterion for model selection. The rationale behind this criterion is the divergence between the true distribution and a candidate measured in terms of the Kullback-Leibler information criterion should reach a minimum (Demidenko 2004). In general, for parametric models the AIC is defined as:

$$AIC = -2\ln L + 2(k + c) \tag{3.12}$$

where k is the number of model covariates (in the case here, k=0) and c is the number of model-specific distributional parameters. The preferred model is the one with the lowest AIC value, though the best-fitting model is the one with the largest log likelihood.

As we can see from Table 3.1, the piecewise exponential specification show decisive evidence against the hypothesis that the transition rates of CI firms is constant over age. Specifically, the failure rates of CI firms increased slowly in their early years of organizational tenure, then jumped significantly between age 2 and 7, after which it slowly declines. In other words, the transit rate is inversely U-shaped, which is in line with numerous studies conducted in the organizational ecology domain (Carroll and Hannan 2000; Bogaert, Boone et al. 2006; Dobrev, Ozdemir et al. 2006). According to the estimates, the piecewise exponential model appears to perform best in all specifications, giving a lowest AIC value of 3164.28. The Log-logistic model is the next closest with an AIC value of 3225.78, whereas other parametric specifications are poor fits with considerably higher AIC values.

Figure 3.2 plots the implications of estimates based on Table 3.1. The figure shows a clearer picture of the fitness of specification among different models. The flexible piecewise exponential model tells what the shape of the baseline hazard of CI population is supposed to be. The Log-logistic model performs reasonably well in terms of capturing this particular shape. However, it still fails to closely approximate the results of the piecewise exponential model, especially in the second segment and later years of organizational tenure. The other three parametric models all perform poorly in terms of fitting the piecewise shape. The Gompertz and Weibull models

assume monotone hazard rates that either increase or decrease exponentially with time, while in the case here, the hazard rates of CI firms are clearly nonmonotonic age dependent. The two models overshoot the piecewise exponential result greatly at age 5 and 6, respectively. The final specification – Log normal, though allowing hazard rates to change with age non-monotonically, is a poor one in approximating the piecewise specification. The model fits poorly in most of the segments except in later years of organizational tenure. Estimates of Figure 3.2 are roughly in line with what we predicted in Table 3.1 (more specifically, the Log-logistic model performs best among four parametric models in terms of fitting the piecewise shape, though still not approximate enough). Figure 3.2 shows a vivid picture that none of the parametric models estimated here fits well with the piecewise shape. In such case it does not make sense to try to represent the data with a parametric specification. Piecewise exponential model is therefore used in Chapter 5 for failure rate analysis in the CI population.

Figure 3.2 Estimates of Age Dependence in the Failure Rates of CI Firms

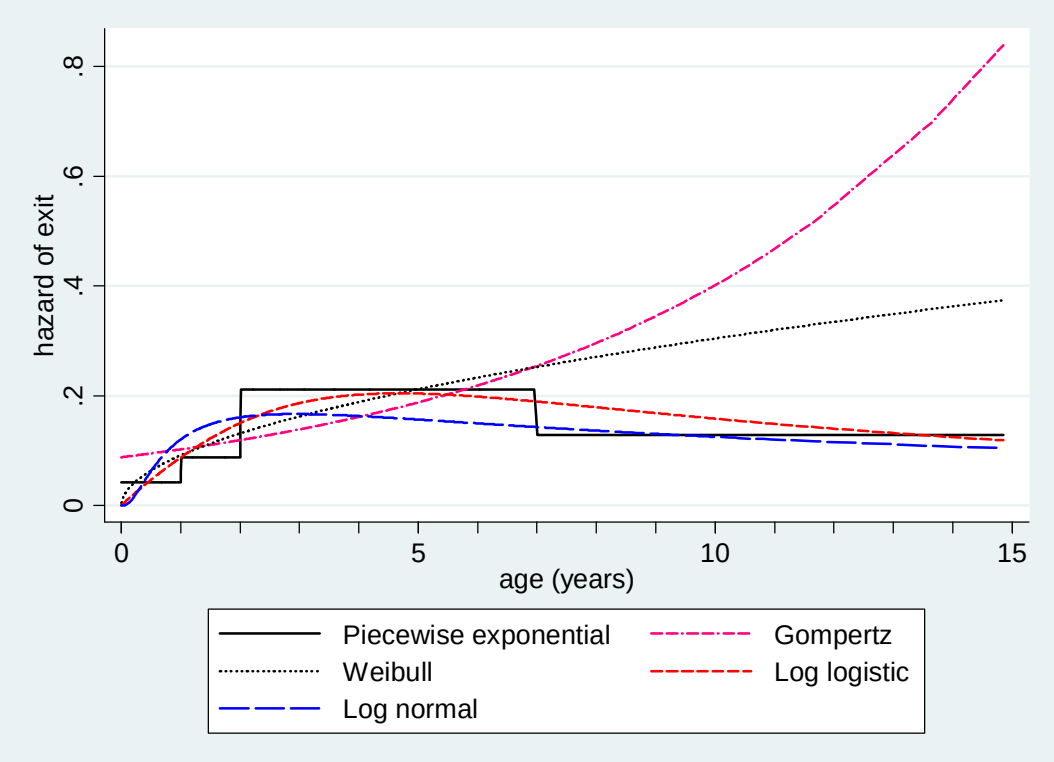


Table 3.2 shows the results of estimation for the whole population, using the same alternative specifications presented above. The piecewise exponential model again shows that the failure rate of the whole population is inversely U-shaped. Hazard rate

appeared to rise rapidly in early years, after which it slowly declines. At later stages of organizational tenure (after age 12), the hazard rate drops significantly. Although log-logistic and log normal specifications display similar shapes to the piecewise model (they assume such a shape when parameters γ and σ are smaller than 1), both of the models appear to be a poor fit with the data with considerably higher AIC values. The other two specifications, Gompertz and Weibull, which cannot handle this non-monotonic form of failure rate, do not improve over the piecewise model. Based on estimates of AIC values, piecewise exponential specification is again the preferred one in all alternative models, giving a lowest AIC value of 21570.52. All the other parametric specifications are poor fits with considerably higher AIC values. Failure rate of the whole population in chapter 4 is therefore estimated by means of piecewise exponential model.

Finally, there are some interesting observations in Tables 3.1 and 3.2 that are worth mentioning. For both CI population and the whole population, firms experience the highest rate of hazard between age 2 and 7. Two pieces of information can probably be revealed from the estimates: (1) CI firms are relatively short-lived (only exist for two years then enter the stage of turbulence); (2) the period of turbulence in an organization's life is relatively long – a CI firm has to survive five years of critical period before finally becoming stabilized. In other words, CI firms in Shenzhen are likely to experience the so called "seven-year itch", that is, they are likely to exit the CI market before 7 years old[21]. This estimate is roughly in line with the survey published by Administration for Industry and Commerce of China: the average life-span of small and medium sized enterprises in China is 2.9 years, whereas that of large enterprises is 7.3 years (Bian and Wu 2006; Jiang 2006).

[21] An examination of the data reveals that 90% of CI firms exited the market before 7 years old.

Table 3.2 Estimates of Alternative Specifications of Age Dependence in the Failure Rates of Firms Engaged in CI Business (Whole Population) in Shenzhen

	Piecewise exponential	Gompertz	Weibull	Log-logistic	Log-normal
$0< u <=1$	-4.060***				
	(-0.061)				
$1< u <=2$	-2.635***				
	(-0.033)				
$2< u <=3$	-1.936***				
	(-0.028)				
$3< u <=4$	-1.851***				
	(-0.032)				
$4< u <=7$	-1.934***				
	(-0.028)				
$7< u <=12$	-2.231***				
	(-0.052)				
$u >12$	-3.145***				
	(-0.378)				
γ		0.131***		0.507***	
		(0.005)		(0.001)	
p			1.571***		
			(0.016)		
σ					0.981
					(0.010)
Constant		-2.792***	-3.299***	1.811***	1.883***
		(0.022)	(0.031)	(0.010)	(0.012)
Log-likelihood	-10778.26	-11542.15	-11111.82	-10921.21	-11198.04
No. of parameters	7	2	2	2	2
AIC value	21570.52	23088.3	22227.64	21846.42	22400.08

Note: 1. Standard errors in parentheses
2. * significant at 10%; ** significant at 5%; *** significant at 1%
3. u refers to age of firms in the whole population, measured in years.

3.5 Model Estimation and Evaluation

In tests of hypotheses developed in this thesis, the chosen models (i.e., negative binomial and piecewise exponential) are estimated by applying the method of Maximum Likelihood (MLE) as implemented in STATA. The general likelihood function $\mathcal{L}()$ has the form

$$\prod_{i=1}^{n} L(\theta_i \mid \beta, x_i) \tag{3.13}$$

for $\beta = (\beta_0, \beta_x)$. In a loose sense of the term, $\mathcal{L}()$ could be viewed as the product of the probability of experiencing an event θ for the i^{th} subject, given the value of the x for the i^{th} subject. The basic idea behind MLE is that, given a set of observations (θ_i), the best estimate of β is the one that maximizes the probability, or likelihood, of observing those particular data (Cleves, Gould et al. 2004). Under certain regularity conditions, maximum likelihood estimations are considered as consistent and asymptotically efficient (Greene 1997).

In evaluation the fit of nested models, the likelihood ratio test, Wald test, and score test are commonly used in empirical studies. Though the three tests are asymptotically equivalent, in finite samples the likelihood ratio test is considered the most reliable (Cox and Hinkley 1974; Parmar and Machin 1995). Following prior researches on organizational vital rates, I use Haberman's chi-square statistic for evaluation of nested models (Haberman 1977). This statistic parallels the likelihood ratio test of a restricted model (M_2) against a less restricted model (M_1):

$$\chi^2(M_2 \mid M_1) = 2[\ln L(M_2) - \ln L(M_1)] \tag{3.14}$$

where $L(M_*)$ denotes likelihood of the respective model, and $\ln L(M_*)$ is the natural log of the model's likelihood. This statistic has been shown to have an asymptotic chi-square distribution with degrees of freedom equal to the difference between the two models, even when expected counts are small (Agresti 1990).

Chapter Four

Organizational Dynamics in a Fuzzy Construction

Existing organizational studies typically follow classical rules in defining the very basic unit of study - organizational populations. That is, an organization is either a member of the population or not a member at all. This chapter follows the recently developed fuzzy-set theory in examining dynamics of organizations in the CI industry, in which membership of a firm is allowed to become partial. The first part of this chapter seeks to test the well-established density-dependence theory in the fuzzy context. Findings show that the theory, which has been confirmed in numerous traditional studies, does not hold in the fuzzy CI population. The second part of the chapter explores in depth the competitive relationship among firms with a varying level of grade of membership (GoM). Received ecological theory claims that organizations with higher GoM tend to experience a lesser degree of competitive pressure than those with lower GoM (Hannan, Pólos et al. 2007). In this chapter, I argue that there are two parts to the story. In particular, organizations with higher GoM do enjoy better life chances than those with lower GoM, but only when the population is positively evaluated. In a population with neutral valence, however, organizations that are less focused in the business associated with the population tend to survive longer than those that are more focused. Findings offer strong support for the proposed theory.

4.1 Categories and Fuzziness

Cultural categories have long been one of the research focuses in sociology. In his early work of investigation in religious beliefs, Durkheim (1912) held that individuals have a basic need to conceptually organize their social worlds into meaningful categories. Audience members usually rely on categories to capture

similarities/distinctions among sets of similar objects and make sense of them. By segmenting reality into "discrete islands of meaning", audiences are able to impose order onto the potentially undifferentiated flux of experience encountered in their everyday lives (Hsu, Negro et al. 2007).

In the world of organizations, the definition of a category typically follows the rules of classical set theory. That is, categories are viewed as crisp sets, sets with the property that each organization of the category is either a full member or not a member at all. In other words, categorical memberships in empirical studies are often represented with classical-set theoretical models. In Hannan, Pólos et al. (2007)'s recent book, however, they argued that such an approach is not realistic in the real world, since there are many situations where some organizations neither clearly belong to a category nor clearly do not belong. Such organizations often fit into the category to a greater or lesser degree. For instance, they cited the term of "university". Clearly, audience members are likely to agree that universities such as Harvard University, Oxford University belong to the category, whereas a university such as the Hamburger University of McDonald's (an employee training centre) does not belong. However, there are other schools, such as Rockefeller University (a research institute with few students and hardly any formal curriculum) and the University of Phoenix (an online education school). Such schools fit the category of "university" in some respects but not in others.

A major line of work in cognitive psychology shows that natural categories tend to lack sharp boundaries and clear definitions (Rosch 1973; 1975; Rosch and Mervis 1975), the varying level of similarity between members in such categories is what Wittgenstein (1953) called a "family resemblance". Building upon cognitive psychological works, Hannan et al. (2007) developed their fuzzy-set theory in the organizational world. They tied the existence of a category to the emergence of strong extensional consensus about a label of a set (cluster, category, or form), and allowed memberships in the set to become partial. They used the concept of "grade of membership" (GoM) to determine the degree to which the agent classifies the object in the set. If the GoM for the agent with regard to a particular object equals 1, then the agent sees the object as a full member of the set. On the contrary, GoM equals 0 means that the agent has no doubt that the object does not belong in the set. Values between 0

and 1 refer to varying degrees of membership to which the agent classifies the object (Hannan, Pólos et al. 2007). In the fuzzy-set construction, category boundaries become fuzzy. Organizations can differ in GoM and belong to more than one population.

Fuzzy Construction of CI population

Defining a category in such a manner is not easy. It requires researchers to capture the fuzzy boundary of a particular category of interest, and make sense of the resemblance that connects scattered sets into a group. Given the fact that the theory was only recently developed, there is no prior instance of research that follows such framework in defining a population of study (at least to my knowledge). The closest story is Bogaert, Boone, and Carroll (2006)'s study of Dutch audit industry, in which they use distribution of professional association memberships in auditing to measure the fuzziness of the audit industry. It is worth noting that "fuzziness" in their case refers to the internal fragmentation in the audit field, and the lack of consensus about the rules of the game. The population itself is still a crisp set – its boundary is clear and unambiguous. In other words, the audit population is still defined in a conventional manner – a bounded set of entities with common form.

In line with fuzzy-set theory, my approach in constructing the corporate identity (CI) consulting population significantly differs from prior researches. Recall that the whole population was defined as a set consisting of two subpopulations, namely, *CI population* – in which firms carry CI label in their corporate names, and *extensional population* – in which firms carry CI label as part of their services offered. Defining a population in such a manner may invite considerable disputes. It is natural to ask, "Is this a meaningful population?" Indeed, firms in the extensional population are all categorically different from that of the CI population. Many of them engage in a totally different market, and appeal to totally different sets of audiences. If we look at these firms in a conventional manner, given the high level of heterogeneity among extensional population, they can by no means be grouped together as a population. However, as I argued earlier in Chapter 3, all these firms in the picture share one element in common – they all include CI consulting as part of services offered

(although different in interpretation towards the CI label)[22]. As such they retain a certain sense of connection with the potential form of corporate identity consultancy, some closer than others. Some of them are very similar to CI firms (e.g., graphic designers), some of them are very dissimilar (e.g., real estate agencies, financial consultants, etc).

The fuzzy boundary of CI population reflects one of the exact natures of organizations in the real world, that is, categories tend to lack sharp boundaries and clear definitions. In my view, my approach to define the population of CI consultancy maps neatly into Hannan et al. (2007)'s fuzzy-set framework. *CI population* in such a case can be viewed as a homogeneous set with relatively high average-GoM in the underlying form of "CI consultancy", whereas GoMs in *extensional population* are expected to vary significantly, but average GoM in the set with regard to the potential CI form is expected to be much lower than in *CI population*. By taking partial membership in the CI label into account, I hope that I can obtain a clearer picture about how the label and the corresponding population are evolving over time, and more importantly, capture the cognitive processes among audience segments with regard to reaching an agreement on a particular label, which organizational ecologists have long sought to understand.

4.2 Density-dependent Theory Revisited

The density-dependence model (Hannan and Freeman 1977; Hannan and Carroll 1992) is perhaps the most powerful and widely accepted ecological model of organizational evolution. The model contains two parts. The first holds that increases in density when the number of organizations is low facilitates cognitive legitimation of a population, which in turn raises its founding rate and lowers its mortality rate. The second part claims that with the increases in density, competition pressure eventually dominates the process, leading to a decline in the founding rate and increase of mortality rate of the population.

[22] As explained earlier, not every firm (a very small number) in the CI population include CI as part of the services offered, but it makes sense to assume they all provide CI consulting service since their corporate names tell everything.

The theory assumes that founding rate in an organizational population, $\lambda(t)$, is directly proportional to the level of legitimation of the population (L) and inversely proportional to the level of competition within the population (C):

$$\lambda(t) \propto \frac{L_t}{C_t} \tag{4.1}$$

Expressing legitimation and competition as particular parametric representations in terms of density has the following form:

$$\lambda(t) = k_t N_t^{\alpha} \exp(\beta N_t^2) \tag{4.2}$$

where the first-order density effect captures the positive effect ($0 < \alpha < 1$) of legitimation, and the second-order density effect represents the negative effect of competition ($\beta < 0$) on the rate. Overall, theory of density dependence assumes an inverted U-shaped relationship between density and the founding rate of the population, with legitimation dominating lower density and competition expressed as a function of high density.

Since its introduction, the density dependence model has been tested in numerous empirical studies (Barnett and Carroll 1987; Olzak and West 1991; Ranger-Moore, Banaszak-Holl et al. 1991). Except for a few exceptional cases[23], predictions of the theory have been largely confirmed in most ecological studies. However, as the very basic unit of study, organizational populations in traditional studies are typically treated as crisp sets (i.e., an organization can at most belong to one population). The theory has rarely been tested in a fuzzy context in which organizations often differ in grade of memberships, and can belong to more than one population (but see Negro, Hannan et al. 2008; Kuilman and Li 2009). The first part of this chapter is therefore to examine the well-established model in the fuzzy CI population, and see whether predictions of the theory still hold in the fuzzy context. More specifically, this chapter will focus only on the competition part of the theory, and leave the legitimation part for next chapter.

[23] For example, in the research on the Dutch audit industry, Boone et al. (2000) found that the first-order effect of density on audit firm exit was positive (implying a competitive effect), whereas Cattani et al. (2003) found that it depressed the founding rates.

In their reformulated specification of the density-dependence theory, Hannan et al. (2007) make two assumptions about diffuse competition in the fuzzy setup: (1) a large number of members with low GoM does exert competitive pressure on the population; (2) lower-GoM members experience stronger selection pressure than those with higher GoM, because they possess a lower level of intrinsic appeal (an argument which will be examined in depth in the next section). However, the reformulation does not change predictions in the earlier theory about diffuse competition. That is, the U-shaped relationship between population density and intensity of competition still holds.

What changed in the reformulation, however, is the definition of density measure. In earlier propositions, organizational density is simply a straight one-for-one count of organizations. It does not take into account the heterogeneity of organizational memberships in the population, which lies in the centre of fuzzy configuration. Specifically, as suggested by Hannan et al. (2007), population density in the fuzzy setup is now measured as a sum of grades of membership of organizations in the population, rather than a simple count of number of organizations. This leads to the concept of *fuzzy density* of organizational populations. Following density dependence theory, I have the following prediction:

Hypothesis 4.1: *Failure rates of firms in the whole population will have a nonmonotonic U-shaped relationship with fuzzy population density*.

In this section I re-examine the well-known density-dependence model in the fuzzy CI population. More specific details of organizational competition, however, are still unclear. For example, how firms with different level of GoM compete with each other? Do firms with higher GoM outlast those with lower GoM? Or is it the other way around? I explore these issues in the next section.

4.3 Category Valence and Fates of Organizations

Cultural classifications are viewed as a significant constraint on human agency. At the organizational level, classifications have profound implications for the success and

failure of firms. In order to receive audience support and gain legitimacy, organizations are often pressured to conform to categorical expectations (Meyer and Rowan 1977; DiMaggio and Powell 1983). Organizations that are difficult to be classified, or violate categorical boundaries are likely to be sanctioned by audiences through downgraded evaluation (Pólos, Hannan et al. 2002; Rao, Monin et al. 2005). For instance, McKendrick and Carroll (2001) cited the example of Reuters, a media company that engaged in many areas including a variety of internet businesses. Analysts and investors often find it problematical to classify and evaluate the company (Goldsmith 1999). The problem of classification uncertainty lead to the high volatility of its stock prices, often with huge losses incurred.

Generally speaking, audiences prefer offerings that clearly belong to a category. In their recent book, Hannan et al. (2007) tied intrinsic appeal of offerings of an organization to its grade of membership in the associated category. They claimed that organizations with higher GoM have a higher level of intrinsic appeal (i.e., audiences normally find offerings of such members more intrinsically appealing), and therefore are stronger competitors in the population. In my view, however, the monotonic function that maps intrinsic appeal of an organization's offerings to its grade of membership in the category probably requires a second thought. Specifically, I argue that the relative competitive pressure experienced by firms with varying degrees of GoM differs by stages of the population life circle.

Categories, as suggested by Hannan et al. (2007), differ in perceived valence. Some categories generally receive a positive evaluation from audience segments, some do not, e.g., "loan shark", "ambulance chaser", etc. In a category with positive valence, audiences generally prefer offerings of members with a higher grade of membership, whereas the opposite is true for categories with negative valence. Audiences' evaluation about a category, however, usually comes at a later stage of the category's life cycle. That is, audiences must first recognize and develop certain understanding of the collective identity of the category before any processes of evaluation can commence. A logical corollary is that if the associated blueprint and schemata of a category are not recognized or accepted by audience segments – a likely case at the time of the first few organizational foundings in what is perhaps to become a new category, it is unlikely that the group of organizations will receive any positive or

negative evaluation from audiences. Rather, I argue that audiences tend to perceive the class of entities as neutral when they lack reliable information about its associated identity[24].

So what does the category (or class) with neutral valence imply for intrinsic appeal of its associated members? Do members with higher GoM still hold an edge over those with lower GoM? As a preliminary argument, I maintain that in a category with neutral valence, the positive relationship between grade of membership and intrinsic appeal does not hold, because GoM is simply not applicable in such a context. GoM of an organization, as we know it, reflects audiences' perceptions about its fit in the category, while such perceptions are typically developed at a later stage upon schematization of the label that associated with the category. In other words, it is unreasonable to assume that audiences assign GoMs to organizations in a category that have not yet received any evaluation. On the other hand, however, I also realize that organizations can and do often differ in their degree of focus on a specific business activity that associated with the category. That is, some can be more specialized than others on certain business activity. Therefore in a category with neutral valence, I refer to a less restrictive notion of "focus", and use it as an approximation to the GoM concept to describe the nature of organizations in a young population. The cultural implication of the focus notion, as I argue here, is similar to that of the GoM concept. They both refer to the degree of similarity between a focal organization and the underlying form, and hence can be measured in a similar manner.

As discussed earlier, category classification imposes significant constraints on its members. That is, organizations that fit the category poorly or violate categorical boundaries are likely to be sanctioned by audiences. It is natural to infer that those members that are less focused in the category experience higher level of selection pressure than those that are more focused. However, I argue that the potency of classification constraint is largely dormant in a category with neutral valence. The reasoning is straight forward: before a category is sufficiently established or evaluated by audiences, the role of categorical boundaries on survival chances of its associated

[24] There are exceptions, however. If a nascent category inherits legitimation from another well-established category (see Boone, Br□echeler et al. 2000), it may enjoy the similarly positive/negative valence as the established category does. Nevertheless, this is not the case in the CI context - I don't see any legitimation spillover in the CI population.

members is negligible, because the cultural boundaries might be indistinct, or do not exist at all.

On the other hand, however, a category with neutral valence is usually unfavourable for its members: the blueprint of the offer (that associated with the category) is largely unknown to audiences, and members do not receive enough attention from the public. Intrinsic appeal of the offer, therefore, should presumably be low for all the members in the category, be it more business focused or less focused. Nevertheless, despite the low intrinsic appeal of the offer, organizations that are less focused in the offer do enjoy the following initial advantages.

(1) *Protection from original firms*. Less-focused members could be pre-existing *de alio* firms[25] which often remain active in other markets (cf. McKendrick, Jaffee et al. 2003). They typically arrive with an ample stock of resources, including capital and personnel (Mitchell 1994). The stock is usually sufficient to provide an extended period of immunity, regardless of the success of the new business they entered (Levinthal 1991).

(2) *Protection from other established markets*. Less-focused members could also be those that have a high level of focus in other markets (they are not necessarily *de alio* firms, e.g., an advertising agency can enter advertising and CI markets at the same time. In such case it may be more focused in the advertising market than in the CI business). Furthermore, it is usually the case that those businesses which they highly focus on are somewhat mature or already established in the market (after all, it is rare for a firm to simultaneously engage in several infant businesses). In other words, they enjoy high level of intrinsic appeal in other established markets. The resources they gained in other markets could provide certain support, including finance, personnel, and technical know-how, for the business which is still at its infant stage.

By contrast, organizations with a higher level of focus face a higher risk of failure, especially when the intrinsic appeal of the offer which they focus on is relatively low. Furthermore, at this initial stage of the market, such organizations are usually *de novo* firms, which typically lack resources and experience. Unlike those that have high

[25] Note that this argument only holds at the initial stage of a category. As the category ages, a de alio firm might become more focused, whereas a de novo firm might become less focused.

intrinsic appeal in other markets or *de alio* firms, they cannot gain assistance or subsidies from original firms or other established businesses. As noted by Bruderl et al. (1992), *de novo* firms also cannot rely on assets in other markets for collateral in seeking financing from banks and other third-party lenders. Taken together, resource shortages and a narrow focus on something which is uncertain likely put these firms in an unsafe position.

In short, less-focused organizations enjoy an initial advantage over those that are more focused on the business that associated with the category, even though the intrinsic appeal of the offer is low. The above consideration leads me to argue:

Hypothesis 4.2: *In a category with neutral valence, organizations that are more focused on the business activity that are associated with the category will have higher initial failure rates than those that are less focused.*

As the category ages, audiences gradually develop schematic classification for the label associated with the category and assign grades of membership to organizations. In the process of schematization, audiences will also assign a general valence to the category, based on observed feature values of the label. If the category is perceived as negative, then offering of higher-GoM members are likely to be judged as inferior to the offering of those with lower GoM, because in such a scenario, intrinsic appeal of the offer is negatively related to the GoM of organizations. However, if the category is perceived as positive (as in the case of CI consultancy), the potency of cultural classification is triggered and now imposes a significant constraint on the associated members in the category. That is, members now are pressured to conform to categorical expectations. Furthermore, the initial advantages of organizations that are less focused on the business that associated with the category are likely to diminish and become liabilities, because the identity blueprint associated with the category is now largely recognized and accepted. In such case, grade of membership has positive impact on intrinsic appeal of the offering. Members with lower GoM are poor fits in the category, and therefore are more likely to be sanctioned by audiences due to their nonconforming status and low intrinsic appeals. Hence, I posit that:

Hypothesis 4.3: *In a category with positive valence, organizations with higher grade of membership (GoM) will have lower failure rates than those with lower GoM*.

Finally, as explained earlier, firms in the CI population should be much more focused on engagement of CI business than firms in the extensional population. In other words, average GoM of firms in the CI population should be much higher than that of firms in the extensional population. By applying the above reasoning, I have the following predictions:

Hypothesis 4.4: *During early stage of evolution of the CI blueprint, organizations in the CI population have higher initial failure rates than those in the extensional population*.

Hypothesis 4.5: *At a later stage of evolution of the CI blueprint, organizations in the CI population will have lower failure rates than those in the extensional population*.

Predictions and justification for Hypotheses 4.2 and 4.3 are summarized in following Table:

Table 4.1 Predictions of Proposed Hypotheses

GoM of Organizations →

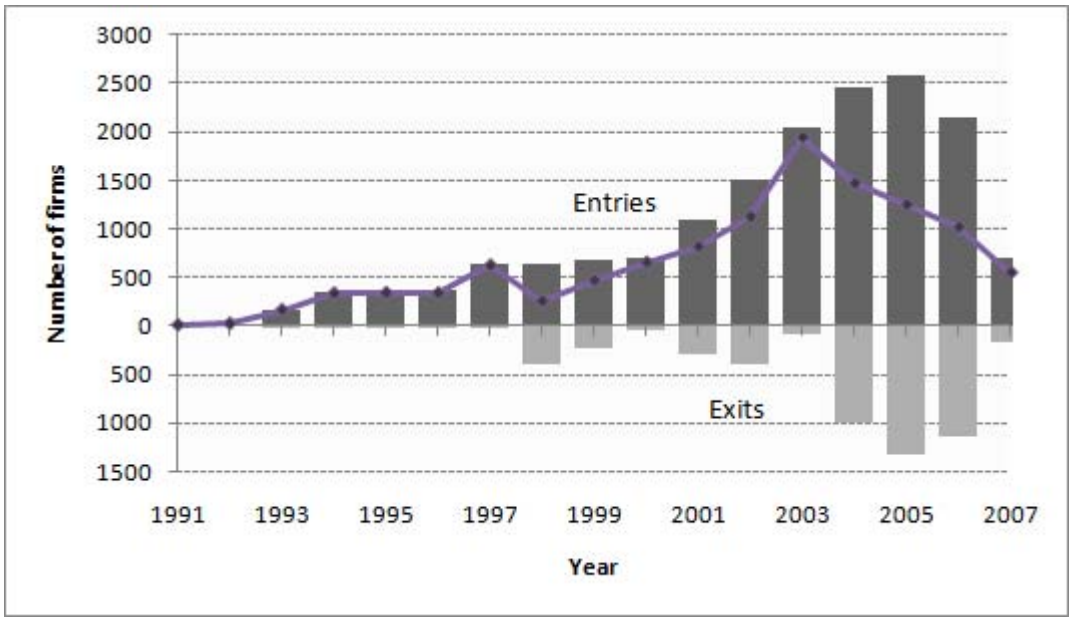
Category Valence →	Lower	Higher
Neutral (young category)	Organizations with lower GoM have lower failure rates (Hypothesis 4.2). Key arguments: 1. Low intrinsic appeal; 2. However, they enjoy protection from existing resources.	Organizations with higher GoM have higher failure rates (Hypothesis 4.2). Key arguments: 1. Low intrinsic appeal; 2. Resource scarcity and lack of protection.
Positive (aged category)	Organizations with lower GoM have higher failure rates (Hypothesis 4.3). Key arguments: 1. Low intrinsic appeal; 2. Advantages of protection from existing resources diminish and become liabilities.	Organizations with higher GoM have lower failure rates (Hypothesis 4.3). Key arguments: 1. High intrinsic appeal; 2. Categorical expectation imposes significant constraints on members with lower GoM.

4.4 Variables and Measures

In this Chapter I want to model failure rates of firms that provide CI consulting service in Shenzhen (i.e., the whole population). Definition of organizational failure follows rules in defining fuzzy population density (as discussed in Chapter 3). Specifically, a firm is deemed to have failed if it disbands or drops CI consulting from the services offered. During the observation period I identified 16,450 firms that entered the CI population, as depicted in Figure 4.1. The data cover the entire history of the corporate identity consultancy in Shenzhen from its inception in January 1991 until May 2007. Over the history of CI movement, there were 5,082 disbanding or industry exits.

In empirical specification, I use organizational age as the clock variable based on which the hazard is estimated. Covariates were updated every given day by using the exact life information of each firm in the population and were converted into decimal numbers.

Figure 4.1 Number of Entries and Exits of the Whole Population (1991 – 2007)



(Note: The number of entries in each year is given by the length of the bar above the x-axis. The number of exits in each year is given by the length of the bar below the x-axis. The solid line shows the annual difference between entries and exits.)

Variables

Grade of membership (GoM_t). The main independent variable in this Chapter is the GoM measure. In my assessment of GoM, I resort to services/businesses which firms intend to engage. As noted in Chapter 3, all firms in China must report to local registration department about their detailed lines of offerings (or changes of offerings) when they start up a new business (or make changes to their offerings). We usually can tell from the offerings reported by a firm (1) the properties of its associated category, (2) how close (or how far) the firm is from others, and (3) the niche width of the firm. In the CI context, the GoM of an organization to the "CI" label is estimated by means of the relative centrality of its associated category in the whole population (that is, I assume all firms in one category share the same GoM). My assessment of GoM in the case here is based on the assumption that the CI category (in which firms carry CI label in company names) has the highest grade of membership in the underlying form of CI consultancy. In other words, services offered by firms in the CI category should reflect "what it should be" for the CI blueprint (A full list of lines of services offered by CI firms can be found in Appendix 4). As such I used offerings provided by CI firms as benchmarks against which lines of services offered by firms in other categories are weighted. The logic of my approach of GoM operation is simple: the higher the weight of a specific line of offering in both of the CI category and the focal category, the greater the GoM value in the focal category. Formally, the GoM of a firm is calculated as follows:

$$GoM_t = \sum \left[\frac{N(CI)_{it}}{N(CI)_t} \times \frac{N_{it}}{N_t} \right] \tag{4.3}$$

where $N(CI)_{it}$ represents the density of the ith service offered by firms in the CI category at time t, $N(CI)_t$ equals the total number of all the services offered in the CI category at time t. In a similar vein, N_{it} denotes the density of the ith service offered by firms in the category of interest at time t, whereas N_t is the total number of services offered by firms in the category of interest at time t. $\frac{N(CI)_{it}}{N(CI)_t}$ tells the weight of the ith service in the category of CI firms, $\frac{N(CI)_{it}}{N(CI)_t} \times N_{it}$ signifies the weighted value

(weighted by benchmarks in the CI category) for the *i*th service in the category of interest. Dividing the total number of weighted services of a category by its total classic services gives its GoM with regard to the CI label.

Table 4.2 provides an illustration of how this variable is calculated. Suppose we have three categories: CI, graphic design, and investment consultancy, each has five lines of services offered, some of them are overlapped. Services in CI category are used as benchmarks against which services in the other two categories are weighted. As we can see in the Table, GoM of CI category is simply the sum of its service ratios squared, whereas GoMs of the other two categories are the summation of their service ratios weighted by the corresponding ratios in the CI category. Three factors matter here in the assessment of GoM: (1) the number of lines of *CI-relevant* service in the focal category (in the example, CI category has four lines of CI-relevant service, whereas the category of graphic design has three, management consultancy has two), (2) the relative weight of CI-relevant services offered in the focal category, and (3) the relative weight of the corresponding lines of service offered in the CI category. Since the category of graphic design is strong in all of the factors, it is therefore very close to CI category (*GoM*: 0.26 vs. 0.3). By contrast, the category of investment consultancy appears to be very marginal (*GoM:* 0.04). It is worth noting that, according to the formula presented above, GoM of a specific category can also be interpreted as the result of its total weighted service-density divided by its total classic service-density in the category.

In actual calculation, the CI consulting service is dropped from all firms in the whole population. There are two reasons for this. The first is that almost every single firm in the whole population includes, or once included, CI consulting as part of services offered (recall from Chapter 3 that there are exceptions for a very small number of CI firms). As a result, the CI consulting service accounts for the largest portion of all the services offered in any category, including the most marginal ones. According to formula 4.3, the higher the weight of a corresponding line of service of a focal category in the CI category, the greater the GoM value in the focal category. In other words, if CI service is included in calculation, GoM values of marginal categories would be unreasonably high (in many cases the value of CI consulting service alone would contribute 90% of overall GoM value in a marginal category). Second, what I

am predominantly interested in here is the degree of relevance of services and categories with respect to CI consulting, rather than the absolute value of CI consulting *per se*. Since CI consulting service is virtually offered by every firm in the population, dropping the service would not cause any loss of vital information. Instead, the divergence and relevance of the focal category with the CI blueprint would as a result become more explicit and perceptible. In short, by dropping CI consulting service from GoM calculation, we are able to make a more accurate estimation of similarity and degree of relevance for firms in different categories.

Table 4.2 Sample Assessment of Average GoM within a Category

Lines of offering	**CI Category**			**Graphic Design Category**			**Investment Consulting Category**		
	Density of services	Weight of services	GoM	Density of services	Weight of services	GoM	Density of services	Weight of services	GoM
CI consulting	Ignored	Ignored	Ignored	Ignored	Ignored	Ignored	Ignored	Ignored	Ignored
graphic design	80	80/200 = 0.4	0.4 × 0.4 = 0.16	90	90/210 = 0.43	0.43 × 0.4 = 0.17	0	0	0
Advertising	60	60/200 = 0.3	0.3 × 0.3 = 0.09	50	50/210 = 0.24	0.24 × 0.3 = 0.07	0	0	0
exhibition consulting	40	40/200 = 0.2	0.2 × 0.2 = 0.04	20	20/210 = 0.10	0.10 × 0.2 = 0.02	20	20/190 = 0.11	0.11 × 0.2 = 0.02
etiquette consulting	20	20/200 = 0.1	0.1 × 0.1 = 0.01	0	0	0	30	30/190 = 0.16	0.16 × 0.1 = 0.02
landscape design	0	0	0	50	50/210 = 0.24	0.24 × 0 = 0	0	0	0
investment consulting	0	0	0	0	0	0	90	90/190 = 0.47	0.47 × 0 = 0
management consulting	0	0	0	0	0	0	50	50/190 = 0.26	0.26 × 0 = 0
Total	**200**	**1**	**0.3**	**210**	**1**	**0.26**	**190**	**1**	**0.04**

It is worth noting that, strictly speaking, the GoMs estimated here do not reflect the "real" grades of membership of firms in reality. For instance, the GoM of CI category is only 0.3 in the sample, which appears to be rather marginal. However, I argue that GoM measured in such a manner does capture the relative distance and similarity between a category of interest and the underlying CI blueprint. The undervalued GoMs in the case here might be regarded as a scale issue. Besides, although absolute values of GoM might vary if different measure approaches are adopted, it is crucial that the

ordering of the GoM values remain unchanged (Kuilman and Li (2009) make a similar argument in their study of foreign banks in Shanghai). In other words, I assume that a different approach would show a similar result of ordering here[26].

Finally, Hypothesis 4.2 uses the notion of "focus" as an approximation of the GoM concept, to capture the level of engagement in the business of interest when the category is young. Since the cultural consequence of the two concepts are similar (they both refer to the relative distance between an organization of interest and the underlying form), the assessment of the level of focus for an organization is therefore approximated through the GoM measure. That is, the measuring variable in Hypothesis 4.2 is still GoM.

Classic density of the whole population (N_w). This variable measures contemporaneous organizational density of the whole population. It indicates the total number of firms engaging in CI business that are active in a given time period. A squared version of density is included in the model to account for non-monotonic effects on failure rates.

Fuzzy density of the whole population (N_{fw}). In contrast to classic density presented above, this variable measures the sum of grades of membership of the organizations at a given point of timeline. A second-order term of fuzzy density is also included to tackle the non-monotonic effects on organizational failure rates.

CI firm. It is a dummy variable indicating that the firm is a member in the CI population, i.e., carrying CI label in its company name.

Population age (T). Population age was defined as the time elapsed (in years) since the first entry of firm into CI business in January 1991. In my model specifications it is the control variable that interacts with the GoM term.

GDP. In order to capture the general trends of economic conditions in Shenzhen, the gross domestic products of Shenzhen during the observation window were added into

[26] If the CI consulting service is included in calculation, the ordering of GoM values of the three sample categories remains unchanged as expected. More specifically, the GoM values for the three categories are: CI category - 0.24, Graphic design - 0.23, Investment - 0.13.

the models. The variable is a useful indicator of business cyclicality for local firms. It was updated every year.

Firm size. I also coded a time-varying variable measuring *firm size* in the year of operation for each firm in the population. I measured firm size based on the start-up funding reported by individual firms when they register with local Administration for Industry and Commerce (or AIC, a governmental body responsible for company registry). Company Law in China requires a minimum funding to be registered with local AIC, for a business to start up[27]. The initial funding required depends on the type of the business, and it must meet minimum requirement set by AIC. However, a more powerful company is always willing to register with AIC a higher level of initial funding, since (a) it is an indicator of power, while power is usually accompanied with reputation and credit; (b) it allows the company to provide/produce wider lines of services/products. A company can change its registered capital in later years of operation, if it is willing to do so. In fact, many firms in China increased their registered capital when they are profitable and plan to increase their lines of business, and some of them reduced their registered capital when they failed to keep in line with the requirement of their initial registration. I coded firm sizes in log form in empirical specifications.

Category density. To account for the effects of increasing categories in the whole population, I included a time-varying variable measuring density of categories at different points of timeline.

Financial crisis. In the late 1990s, a serious financial crisis erupted in Southeast Asia, in which Hong Kong was badly affected. Shenzhen is very close to Hong Kong (just one bridge away), and more importantly, its economy was highly dependent on the performance of Hong Kong at that time. To take account for the possible effect of economic turbulence in Hong Kong that might influence firms' exit in Shenzhen, I included a dummy variable that equals one for years 1997-1998 and zero otherwise.

[27] Among others, registration of initial funding allows the local government to check whether the company has the capability and accountability to start up the business which it intends to enter.

Tables 4.3 summarizes the descriptive statistics for variables used in empirical analysis. Correlations can be found in Appendix A5.1. Note that the grades of membership of the CI and extensional population are also included in the Table. The statistics confirm my earlier speculation about the homogeneity of CI population and the variance in GoMs of the extensional population. It is evident that average GoM of the CI population is indeed significantly higher than that of the extensional population (0.30 vs. 0.04). Besides, GoMs of extensional population vary considerably, running from 0.01 to 0.29. In short, we are confident that the CI population is much more homogeneous than the extensional one.

Table 4.3 Descriptive Statistics for Variables in the Event History (Split-Spell) File (for the Whole Population)

Variable	Min	Max	Mean	Std. Dev.
Firm size	0.05	11.18	3.75	1.54
GDP	0.23	68.02	45.71	19.36
Financial crisis	0.00	1.00	0.07	0.25
Classic density (N_w) × 10^{-2}	0.00	114.28	75.69	35.61
N_w^2 × 10^{-5}	0.00	1305.99	699.72	486.28
Fuzzy density (N_{fw})	0.00	652.42	491.00	183.51
N_{fw}^2 × 10^{-3}	0.00	425.65	274.76	145.65
Category density	1.00	59.00	55.52	6.70
Population age (T)	0.00	16.67	13.20	3.38
GoM_t	0.01	0.33	0.06	0.08
GoM_t × T	0.00	4.48	0.77	1.00
CI firm	0.00	1.00	0.09	0.29
CI firm × T	0.00	16.42	1.20	3.85
GoM (CI population) †	0.26	0.33	0.30	0.02
GoM (Extensional population) †	0.01	0.29	0.04	0.04

Note: Number of entries: 16,450; number of failures: 5082; number of spells: 66,598

† Descriptive statistics for the GoM of CI and extensional population are also given here, for the purpose of reference only. They are not used in following analysis.

4.5 Model Estimation

I use event history analysis to model the failure rate of firms in the whole population as a function of organizational age, population age, and a vector of organization-

population level control variables discussed above. I use the piecewise exponential function to represent variation in organizational age. In the models presented below, I specified seven time pieces (< 1 years; 1 to 2 years; 2 to 3 years; 3 to 4 years; 4 to 7 years; 7 to 12 years; and > 12 years) based on comparing the models' fit with alternative time specifications. The estimates that I report are obtained by applying the method of maximum likelihood. For a detailed explanation of research methods chose here, readers can refer back to Chapter 3.

4.6 Results

Table 4.4 presents results of the analysis of failure rates of firms that claim to engage in CI business in Shenzhen between 1991 and 2007. Model 1 is a baseline that includes control variables for the organizational tenure segments, period effect, firm size, GDP, the imprinting effect of crowding at entry, category density, and population age. Before introducing the concept of fuzzy density, in Model 2 I enter the first- and second-order terms of classic density, for the purpose of examining whether the classic terms of density work in a fuzzy context. The inclusion of the measures significantly improves model's fit over Model 1, however, the effects of density measures point to a direction contrary to the predictions of density-dependence theory. Nevertheless, the result is deemed reasonable, since the classic density measure does not take into account possible heterogeneity among organizational members of the population.

In Model 3 the first-order term of fuzzy density is entered. The inclusion of the variable again dramatically improves model's fit over Model 1 ($\chi^2[L_3\text{-}L_1]= 118.76$ with $p<0.0001$ for 1 d.f.). The significantly negative effect appears to confirm the predictions of the theory that organizational failure rates initially fall with increasing density. In Model 4 I enter the second-order tem of fuzzy density; again, model's fit improves significantly. However, the picture unexpectedly changed. The first-order term of fuzzy density changes from negative to positive, and the relationship between organizational failure rates and fuzzy density is inversely U-shaped: increases at low-level fuzzy density raise failure rate of all firms, whereas increases at high-level density depress it. Hypothesis 4.1 is therefore rejected.

Table 4.4 ML Estimates of Piecewise Constant Rate Models of Disbanding/Exit for the Whole Population, 1991-2007

Variable	Model 1	Model 2	Model 3	Model 4
Tenure: 0<u<=1	-5.134***	-3.872***	-7.827***	-9.455***
	(0.239)	(0.426)	(0.369)	(0.480)
Tenure: 1<u<=2	-3.658***	-2.442***	-6.364***	-8.025***
	(0.233)	(0.424)	(0.365)	(0.477)
Tenure: 2<u<=3	-2.936***	-1.730***	-5.651***	-7.319***
	(0.232)	(0.424)	(0.365)	(0.476)
Tenure: 3<u<=4	-2.801***	-1.613***	-5.514***	-7.197***
	(0.234)	(0.425)	(0.366)	(0.476)
Tenure: 4<u<=7	-2.717***	-1.568***	-5.429***	-7.149***
	(0.235)	(0.426)	(0.367)	(0.477)
Tenure: 7<u<=12	-2.563***	-1.421***	-5.261***	-6.972***
	(0.244)	(0.430)	(0.372)	(0.482)
Tenure: u>12	-2.834***	-1.256**	-5.583***	-7.074***
	(0.445)	(0.572)	(0.528)	(0.608)
Firm Size	-0.309***	-0.269***	-0.302***	-0.268***
	(0.011)	(0.012)	(0.011)	(0.011)
GDP	-0.134***	0.103***	-0.156***	0.045***
	(0.005)	(0.008)	(0.005)	(0.010)
Financial Crisis	0.298***	1.342***	0.506***	1.730***
	(0.064)	(0.089)	(0.070)	(0.095)
Category density	0.002***	0.004***	0.002***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Population age (T)	0.619***	-0.386***	1.108***	-0.036
	(0.032)	(0.068)	(0.058)	(0.079)
Classic density (N_w) × 10^{-2}		0.105***		
		(0.007)		
N_w^2 × 10^{-5}		-0.010***		
		(0.000)		
Fuzzy density (N_{fw})			-0.006***	0.036***
			(0.001)	(0.001)
N_{fw}^2 × 10^{-3}				-0.049***
				(0.002)
Observations	66598	66598	66598	66598
Log-likelihood	-9133.34	-8170.32	-9073.96	-8496.49
Haberman's χ^2 (Δd.f.)		1926.03*** (2)	118.76*** (1)	1154.94*** (1)
Against Model		Model 1	Model 1	Model 3

Note: Standard errors in parentheses

* p<0.05; ** p<0.01%; *** p<0.001

As a preliminary argument, I speculate that in the fuzzy context, the model of density-dependence alone might not be enough to explain organizational dynamics properly, at least in my CI population. Although the measure of fuzzy density already captures heterogeneity of the population and accounts for possible competition among different social actors, other key information of the population however, is still missing. For example, a question such as "what is the relative proportion of members with higher/lower GoM in the population" is still unclear. At any given point of fuzzy density, we don't know whether higher-GoM members dominate the population or lower-GoM members take the lead, and more importantly, how they contrast with each other. I conjecture that such missing information might explain the "odd" effects found in the analysis.

It is worth noting that there are some inconsistent variables in the models. The signs of the coefficients change for both GDP and population age when the density terms are added (in Model 2 and 4). The effects of the former change from negative to positive, whereas the effects of the latter change from positive to negative. Furthermore, population age become nonsignificant in Model 4. I suspect that this is due to the high correlation between GDP and high density (as can be found in Appendix 5).

It is important to note that high correlation among (some) covariates suggests potential problems of multicollinearity (Maddala 1988; Kennedy 1992). However, estimates with collinear data do not violate the standard assumptions of regression and offer unbiased and efficient estimates (Kennedy 1992; Greene 2000). Therefore when statistically significant support is found with collinear data, econometric textbooks suggest that multicollinearity is usually not a problem (see McKendrick, Jaffee et al. 2003 for a general discussion). Nevertheless, to eliminate doubts about the validity and robustness of my results, in Model 5 and 6 (Table 4.5), I re-run Model 2 and 4 without GDP and population included. The effects for both classic density and fuzzy density measures remain significant, and most importantly, they point to the same directions as estimated in Model 2 and 4. The estimates confirm that issues of multicollinearity do not affect the findings here.

Table 4.5 Alternative Specifications of Density Effects on the Failure Rates of Firms in the Whole Population, 1991-2007

Variable	Model 5	Model 6
Tenure: 0<u<=1	-5.388***	-8.312***
	(0.142)	(0.227)
Tenure: 1<u<=2	-3.935***	-6.866***
	(0.133)	(0.221)
Tenure: 2<u<=3	-3.215***	-6.155***
	(0.131)	(0.220)
Tenure: 3<u<=4	-3.095***	-6.035***
	(0.133)	(0.222)
Tenure: 4<u<=7	-3.046***	-5.981***
	(0.135)	(0.223)
Tenure: 7<u<=12	-2.903***	-5.799***
	(0.147)	(0.231)
Tenure: u>12	-2.687***	-5.847***
	(0.401)	(0.435)
Firm Size	-0.286***	-0.284***
	(0.011)	(0.011)
Financial Crisis	1.360***	1.468***
	(0.073)	(0.080)
Category density	0.004***	0.003***
	(0.001)	(0.001)
Classic density (N_w) × 10^{-2}	0.108***	
	(0.003)	
N_w^2 × 10^{-5}	-0.009***	
	(0.000)	
Fuzzy density (N_{fw})		0.032***
		(0.001)
N_{fw}^2 × 10^{-3}		-0.040***
		(0.001)
Observations	66598	66598
Log-likelihood	-8255.39	-8539.39
Wald Chi2	19547.03***	20424.69***

Note: Standard errors in parentheses

* p<0.05; ** p<0.01%; *** p<0.001

Table 4.6 presents the result of second set of firms' disbanding/exit estimates. Model 7 reveals what happened when I enter GoM measure. The significant positive coefficient shows clearly that organizations with higher GoM have higher initial mortality rates than those with lower GoM, offering support for Hypothesis 4.2. Model 8 places the variable in the age-dependent vector, aiming to test Hypothesis 4.3. The inclusion of the age-dependent covariate significantly improves the fit over Model 7 as indicated by the Haberman's chi-square value. In this model, the GoM variable shows a particularly

Table 4.6 ML Estimates of Piecewise Constant Rate Models of Disbanding/Exit for the Whole Population, 1991-2007 (continued)

Variable	Model 7	Model 8	Model 9	Model 10
Tenure: 0<u<=1	-9.285***	-9.617***	-9.446***	-9.503***
	(0.481)	(0.482)	(0.480)	(0.480)
Tenure: 1<u<=2	-7.852***	-8.182***	-8.016***	-8.069***
	(0.479)	(0.480)	(0.477)	(0.477)
Tenure: 2<u<=3	-7.140***	-7.467***	-7.309***	-7.358***
	(0.478)	(0.479)	(0.476)	(0.476)
Tenure: 3<u<=4	-7.015***	-7.335***	-7.187***	-7.231***
	(0.478)	(0.479)	(0.477)	(0.477)
Tenure: 4<u<=7	-6.960***	-7.276***	-7.139***	-7.178***
	(0.479)	(0.480)	(0.477)	(0.477)
Tenure: 7<u<=12	-6.780***	-7.099***	-6.965***	-7.010***
	(0.484)	(0.484)	(0.482)	(0.482)
Tenure: u>12	-6.884***	-7.215***	-7.069***	-7.139***
	(0.610)	(0.610)	(0.608)	(0.608)
Firm Size	-0.282***	-0.283***	-0.269***	-0.271***
	(0.012)	(0.012)	(0.012)	(0.012)
GDP	0.047***	0.049***	0.045***	0.047***
	(0.010)	(0.010)	(0.010)	(0.010)
Financial Crisis	1.739***	1.730***	1.728***	1.740***
	(0.096)	(0.095)	(0.095)	(0.095)
Category density	0.001	0.001	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Population age (T)	-0.043	-0.034	-0.036	-0.039
	(0.079)	(0.079)	(0.079)	(0.079)
Fuzzy density (N_{ft})	0.036***	0.036***	0.036***	0.036***
	(0.001)	(0.001)	(0.001)	(0.001)
$N_{ft}^2 \times 10^{-3}$	-0.049***	-0.050***	-0.049***	-0.049***
	(0.002)	(0.002)	(0.002)	(0.002)
GoM_t	1.254***	4.314***		
	(0.180)	(0.872)		
$GoM_t \times T$		-0.432***		
		(0.067)		
CI firm			0.062***	0.943***
			(0.042)	(0.233)
CI firm $\times$ T				-0.076***
				(0.018)
Observations	66598	66598	66598	66598
Log-likelihood	-8471.03	-8450.87	-8480.39	-8486.18
Haberman's χ^2 $_{(\Delta d.f.)}$	50.91*** $_{(1)}$	40.31*** $_{(1)}$	32.2*** $_{(1)}$	18.42*** $_{(1)}$
Against Model	Model 4	Model 7	Model 4	Model 9

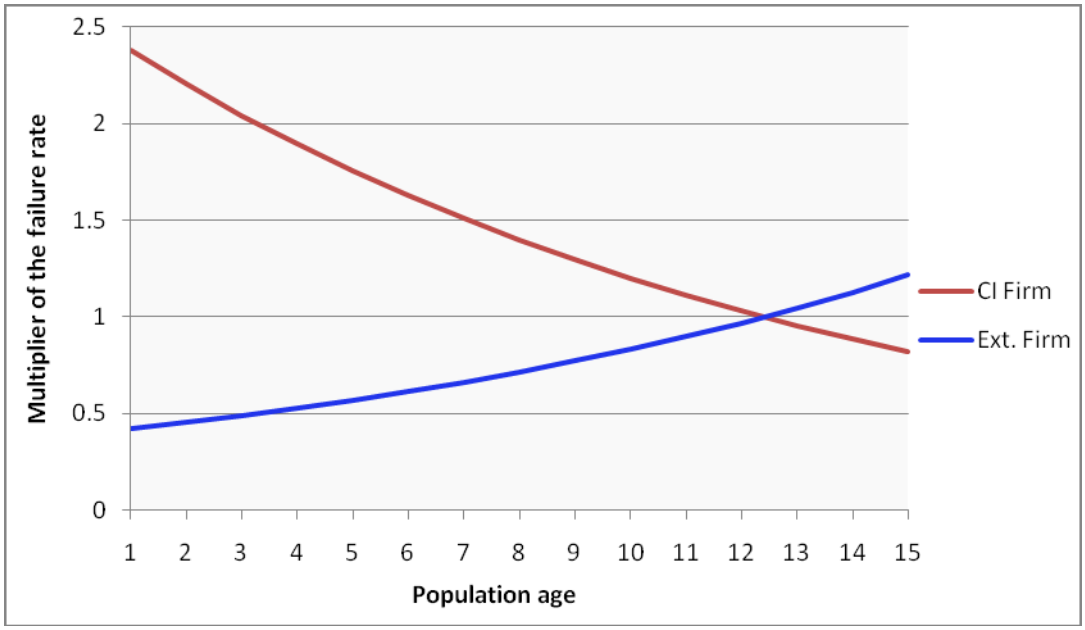
Note: Standard errors in parentheses

* p<0.05; ** p<0.01%; *** p<0.001

strong positive effect in the age-independent vector (as before) and a significantly negative effect in the age-dependent vector, offering strong support for Hypotheses 4.2 and 4.3.

Models (9) to (10) represent similar specifications (as above) designed to test Hypotheses 4.4 and 4.5. The inclusion of the dummy variable of CI firm in Model 9 significantly improves model's fit over Model 4. The effect of the age-independent variable is strong and positive, confirming prediction of Hypothesis 4.4 that CI firms experience higher level of competitive pressure than firms in the extensional population when the population is young. Model 10 then enters the interaction term between CI firm and population age. Again, model's fit improves significantly. The age-dependent variable exhibits a particularly strong negative effect on firm exit, indicating that as the population ages CI firms eventually outlast those firms in the extensional population. Hypothesis 4.5 is strongly supported.

Figure 4.2 Predicted Effects of CI Firms and Extensional Firms from Equation 8



Using estimates shown in Model 10, Figure 4.2 provides a plot of predicted effects for the two basic types of members: CI firms and extensional firms (i.e., firms in the extensional population). It can be seen from the Figure that both types of firms exhibit monotonic effects on firm exit. The effect of CI firms is monotonically decreasing, whereas that of extensional firms is monotonically increasing. CI firms have

particularly high initial failure rate, and they always experience higher level of competitive pressure than extensional firms until the population reaches 12.5 years old. After that point, extensional firms are more likely to exit the CI market than CI firms do. The Figure shows clearly that the two types of firms exhibit distinct competition trajectory, as predicted in Hypothesis 4.4 and 4.5.

There are some interesting effects of control variables that are worth mentioning. The estimated negative effect of firm size in all the models reveals that the overall hazard of exit declines with organizational size. I also find positive effect for the term of financial crisis in all models (as one would expect), meaning that the financial crisis that erupted in Southeast Asia in the late 1990s did in a certain sense negatively affect survival chances of firms in Shenzhen. The same consistently positive effects are also found for the term of category density, suggesting that increasing numbers of different categories (i.e., increasing fragmentation) is unfavourable for the whole population.

Finally, it is worth pointing out that the assumption of independence of observations may not hold here[28], the conventional estimate of the variance-covariance matrix of the coefficients (and, hence, the standard errors) as a result may not be appropriate. To check robustness of the results, I re-estimate models in Table 4.6 by applying the Huber-White sandwich estimator of variance (Wooldridge 2002) to calculate robust standard errors. Results are shown in Appendix 6 (Table A6.1), with estimates of significance level very similar to that of Table 4.6. The coefficients for the four main independent variables are all significant at the level of 0.001 (except in Model 9, where the significance level for the CI firm variable is 0.05). The validity and robustness of my results is therefore confirmed.

4.7 Discussion

This Chapter investigated a number of issues based on fuzzy-set framework. The first part of the Chapter examined diffuse competition among organizations in the fuzzy CI population, using the well-known ecological theory of density dependence. Predictions

[28] Because the covariates vary over time; time-varying covariates imply repeated observations of the same firm (see Bogaert, Boone et al. 2006 for a general discussion).

of the theory have been confirmed in numerous empirical studies, yet the theory has never been tested in a fuzzy context where organizational memberships in the population are allowed to become partial and an organization can belong to more than one population (but see Bogaert, Boone et al. 2006; Kovacs 2006). The introduction of fuzzy-set concept significantly changes our perceptions of the organizational world. At the same time however, it also poses a considerable challenge to empirical research, especially in defining a meaningful fuzzy population, and collecting GoMs of organizations over long periods of a populations' history.

The findings showed that the well-established density-dependence theory does not hold in the fuzzy CI population, even the density measure is reformulated to take into account possible heterogeneity of organizational memberships in the population. Specifically, I found that low-level increases in fuzzy density stimulate competition, while high-level increases in density drive legitimation. Why would this be the case? The "odd" result prompts me to question the generalizability of applying the density-dependence model in a fuzzy context. As a preliminary argument, I speculate that perhaps other underlying mechanisms, rather than density, could better explain organizational dynamics in such a context. In their reformulation of organizational legitimation, Hannan et al. (2007) propose that increasing level of consensus among audiences about the meaning of the label that associated with a category facilitates legitimation, while the opposite occurs when level of consensus drops. This is what they called "contrast dependence" theory. The theory implicitly suggests that increasing numbers of organizations with lower GoM likely confuse audiences' perception and lower their level of consensus toward the label, and hence lead to a higher level of mortality rates for all the members in the population. I suggest that such perspective might help solve the inconsistency of density dependence found in this Chapter.

As explained earlier, key information about the weight of members with varying level of GoM in the population is missing in the fuzzy density measure. Although the notion of fuzzy density carries information on organizational heterogeneity, it fails to capture audiences' consensus level about the underlying blueprint of the population. In other words, increases in density when the density level is low could be those members with lower GoM, whereas high-level increases in fuzzy density could be those with higher

GoM. If this is the case, then findings in the analysis are not odd at all. However, such information is simply unknown in the density-dependence model, and the above argument can at most be speculation. In short, I suggest that contrast dependence might work better than density dependence in studying organizational dynamics in a fuzzy context (as such, the theory will be examined in depth in the next Chapter).

The second part of the Chapter asked whether organizations with higher GoM outlast those with lower GoM, or is it the other way around. My theory offers an explanation that is supported by the data. My main argument is that category with neutral valence favours organizations that are less focused on the offer (that associated with category), whereas category with positive valence favours organizations with higher level of GoM. When the category valence is neutral, cultural classification of the category has very weak constraints on its members, and both higher- and lower-GoM members face the same disadvantage: the intrinsic appeal of the offer that associated with the category is low for all the members. However, since lower-GoM members enjoy protection from their various established resources, the selection pressure they experience is likely to be lower than higher-GoM members. When the population is positively evaluated, however, cultural classification now imposes significant constraints on members of the category, that is, organizations are now pressured to conform to categorical expectations. Lower-GoM members are poor fits in the category, therefore they have a lower level of intrinsic appeal and are more likely to be eliminated by competition pressure than those with higher GoM.

With the propositions developed in this Chapter, the researches of fates/effects of *de novo* and *de alio* firms could perhaps be addressed in a new light. The fates/effects of new startup entrants (*de novo*) and pre-existing producers (*de alio*) have long been debated within contemporary theories of organizations (Mitchell 1989; Carroll, Lyda et al. 1996; McKendrick, Jaffee et al. 2003; Perretti, Negro et al. 2008). For instance, in their study of the American automobile industry, Carroll et al. (1996) found that *de alio* producers face lower level of mortality rates than *de novo* ones at all ages[29]. Their findings can perhaps be incorporated with my theory.

[29] Specifically, they differentiate de novo firms between those with and those without preproduction activities. They found that de novo firms with preproduction show the lowest initial mortality rate and

By deriving their primary identity exclusively from one domain, *de novo* firms are said to possess more focused identities that favour clearer perceptions among audiences than *de alio* ones. In other words, in a category with neutral valence, those members that are more focused on the offer (that associated with the category) are usually *de novo* firms, whereas those that are less focused are typically *de alio* ones[30]. In Carroll et al. (1996)'s case, when the automobile industry is very young, those *de alio* producers that came from other industries could enjoy protection from their original firms, either in capital or personnel, which provided an extended period of immunity for the automobile industry entered, hence they had lower initial mortality rates than *de novo* entrants. As the population ages, however, the roles of *de novo*/*de alio* firms could be reversed. For instance, it is possible that those *de alio* firms could gradually become firms with higher GoM while de novo ones could become diversified. If this is what happened in the US automobile industry, then *de alio* firms will continue to enjoy better competitive advantage than de novo ones. Of course, we don't have detailed information about the grades of memberships of *de no*/*de alio* firms at a later stage of population, and the above arguments are only conjectures.

My findings contribute to the existing literature in several ways. First, the findings reported here invites re-examination of organizational ecology's density-dependence model from a more complete or different perspective. The model works reasonably well in classic population, however, the picture of organizational dynamics changes considerably in a fuzzy setup. The model alone might not be able to cope with new challenges posed by the new fuzzy-set theory. In fact, as speculated by Hannan et al. (2007), both contrast and density might work together in shaping organizational legitimation and competition. Second, the findings extend our understanding of patterns of organizational competition. It provides a complete picture of diffuse competition by attending to natures of organizations at early stage of a population. The efforts can help solve certain inconsistencies found in earlier studies. And finally, this Chapter demonstrates a new approach in defining a fuzzy population and measuring grade of membership. Since the fuzzy-set theory is just recently developed, prior

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then show the highest death rate at later ages; whereas mortality rates of de novo firms without preproduction are always higher than that of de alio firms.

[30] Note again that such analogy only holds in a category that is at its initial stage of operation.

examples in this direction are scant. My approach can therefore serve as a reference for other researchers in future organizational studies.

Chapter Five

Organizational Legitimation Revisited

This chapter seeks to examine the question, "how and when will a new organizational form emerge?" in the context of CI population. Theories about the emergence of organizational forms abound in the last two decades. This chapter follows the recently developed contrast-dependence theory, but with some adaptations. I argue that in general, increasing level of contrast facilitates legitimation of the population, but under certain circumstances, it may undermine the process. I made two major claims in this Chapter: (1) Carrying capacity of an environment in which a population presents changes positively with legitimation level of the population. In other words, environment is endogenous, rather than exogenous, as assumed in all available ecological models. (2) Different level of contrast works differently with varying level of carrying capacity. On the one hand, if carrying capacity of the environment is small, increasing contrast level of the population will (temporarily) hamper its road to legitimation; on the other hand, if carrying capacity is sufficiently expanded, population-level legitimation will work hand in hand with the contrast level. Findings provide strong evidence for the salience of the proposed theory.

5.1 A Short Review of Theories on Forms Emergence

Over the past two decades, the emergence of new organizational forms remains one of the hottest issues discussed in organizational sociology. Organizational ecologists have long sought to answer the question, "why are there so many kinds of organizations?" (Hannan and Freeman 1977; 1989). Among others, the question invites investigation of sources of increasing organizational diversity. As stressed by Hannan and Freeman (1989), organizational diversity plays a key role in modern societies: "*the ability of a society as a whole to respond to changing conditions depends on the responsiveness of*

its constituent organizations and on the diversity of its organizational populations." Empirically, dynamics of organizational diversity is often investigated through emergence of new organizational forms. Questions such as "where/when do organizational forms come from" are often of great interest to organizational ecologists (Hannan and Freeman 1986; McKendrick, Jaffee et al. 2003). In this chapter I follow a similar vein. In particular, the issue I attempt to explore is, "what are the chances that CI consultancy will become a legitimated organizational form?"

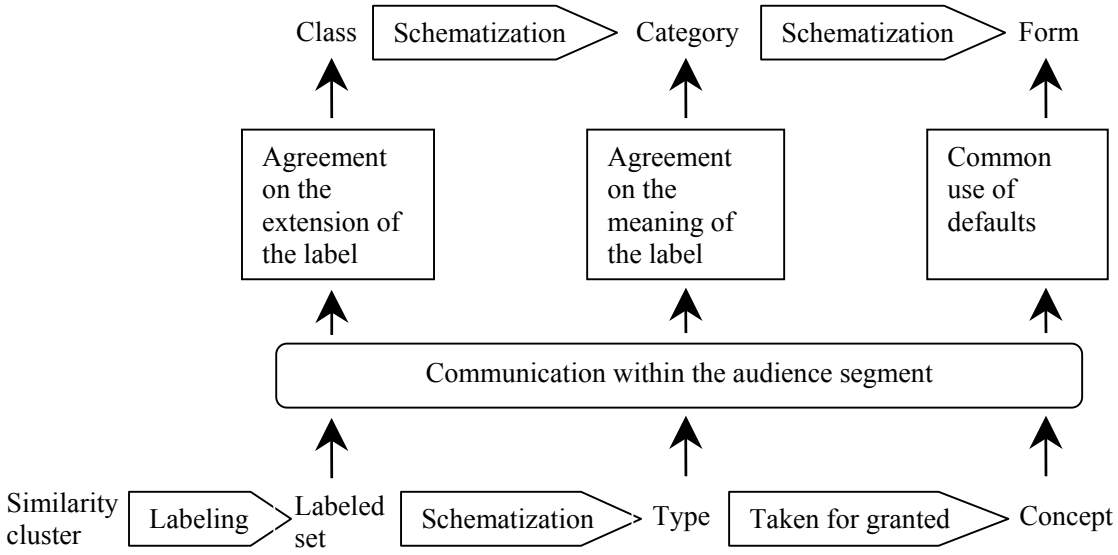
A number of theories arose in the past decade aiming to address the issue of form emergence (see Scott 1995; Ruef 2000). Among others, neo-institutional theorists stress that legitimacy is embedded in relational networks and normative codes of conduct (Meyer and Rowan 1977; DiMaggio and Powell 1983). They view emergence of an organizational form as a process shaped by political actions and social movement. Legitimation in such a perspective is what Aldrich and Fiol (1994) called "socio-political legitimacy". By contrast, organizational ecologists focus on cognitive legitimacy, which refers to a more subtle process of gaining the standing of a taken-for-granted element in a social structure. Such an approach emphasizes the role of organizational proliferation in establishing a form. In particular, organizational ecologists typically use the well-known density-dependence theory to model the legitimation process of a form. According to the theory, as the density of organizations holding a particular identity reaches a certain threshold, the population eventually become legitimated organizational form. Empirical evidence repeatedly confirm its prediction that density decreases mortality and increases founding rates in emerging populations (see Carroll and Hannan 2000; Lomi 2000; Dobrev, Ozdemir et al. 2006; Lazzeretti 2006). This thesis follows organizational ecologists' approach in investigating form emergence, in other words, legitimacy here refers to cognitive legitimacy.

Following the density-dependence framework, McKendrick and Carroll (2001; 2003) later argued that the density of organizations with perceptually focused identities, rather than total density, facilitates form emergence. In their study of disk array market, they found that higher density of *de novo* producers (start-ups in the market) lead to lower failure rate for all producers, whereas the opposite is true for the density of *de alio* producers (lateral entrants). They suggested that by deriving their primary identity

exclusively from one industry, *de novo* producers are more likely to develop a collective identity than *de alio* producers do. Researchers eventually decided that investigating form emergence should take into account a more subtle and basic subject of study – the perceptions and cognitions of the relevant audiences.

In their recent book, Hannan et al. (2007) reached the very origin of form emergence. They consider the emergence of similarity clusters among audiences as a possible origin of forms. In order to make sense of a particular domain, enthusiasts usually attach labels to the clusters. When an audience segment obtains a high degree of extensional consensus about using a label, the label is referred to as denoting a "class". In the next step, audience members attempt to make sense of classes - a process involves the development of schemata for labels. That is, they try to abstract the distinctions that establish which belongs to a class to one degree or another and which do not. If audience achieves a high level of consensus about the meaning of a label in the sense that their schemata for the label are similar, then the class becomes a category. If the category later becomes highly legitimated[31], i.e., its existence is treated by audiences as natural and taken for granted, then the category becomes a form. The process of form emergence is visualized in Figure 5.1.

Figure 5.1 Summary of the Form Emergence Process



(Excerpted from Hannan, Pólos and Carroll (2007). Copyright Princeton University Press. Used with permission.)

[31] Legitimation, as redefined by Hannan et al. (2007), means defaults about conformity of organizational feature values to their schemata for the label associated with a category.

Building upon the above ideas, Hannan et al. (2007) reconstructed the legitimation process. They claim that legitimation grows with the level of consensus within the audience segments about the meaning of a label, which implies that legitimation now depends on contrast of a population (the extent to which the population stands out against its background). This leads to the theory of "contrast dependence", that is, the expected level of legitimation of a population increases monotonically with the contrast of the population. In my view, contrast dependence provides a more insightful and reasonable perspective in explaining organizational evolution. Given the theory is just recently developed, empirical researches following such perspective are scant. There are two interesting examples though. In the investigation of Dutch audit industry in the 19th century, Bogaert, et al. (2006) found that legitimation is not a spontaneous result of organizational proliferation. If population fragmentation increases with the density of organization, the augmentation of density will hamper, rather than facilitate, the road to legitimation of the population. They suggested that the simultaneous presence of both density and contrast (or homogeneity) is necessary to spur establishment of a form. In another study in the wine-making industry in Italy, Negro and his colleagues (2008) suggest that contrast can be measured as the average width of niches in a space of fuzzy categories. They argue that widespread straddling lowers the contrast of a category and that lowered contrast reduces the appeal of offerings in the category. They also predict that the appeal to an audience of all offerings in a category will decline as average categorical niche width rises, as multiple-category memberships proliferate.

5.2 Contrast Dependence Revisited

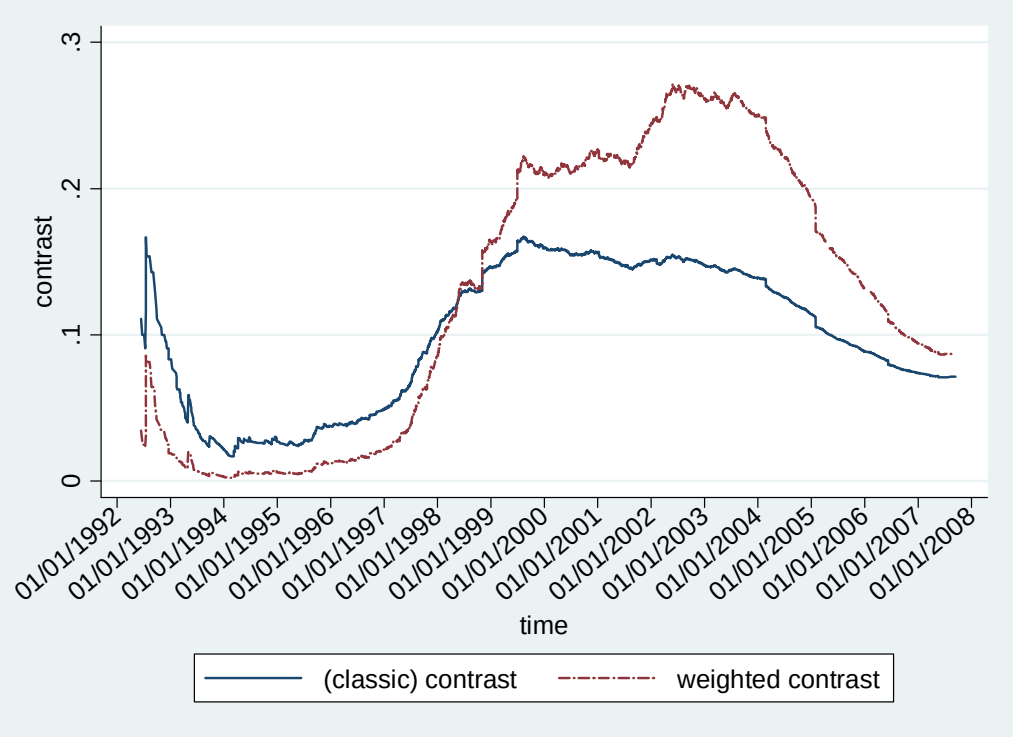
In this Chapter I follow Hannan et al.'s (2007) contrast dependence model in investigating legitimation of CI consultancy in Shenzhen. The model explicitly takes into account the perceptions and cultural understandings of external audiences, which are keys to understand form emergence. Among others, the model postulates that the level of legitimation increases monotonically with the level of contrast of population. Higher level of contrast means there is a greater intensional consensus in the audience segment about the meaning of a particular label. Audience members are less likely to

be confused about the category and are more likely to treat satisfaction of any given schema as a default for members of the category. Though density is not included in model configuration, Hannan et al. (2007) suggested that both contrast and density might matter in the development of legitimation. For the sake of simplicity, this Chapter concentrates on contrast dependence.

Recall that the whole population in my study consists of two subsets: *CI population* (carrying CI label in corporate names) and *extensional population* (carrying CI label as part of services offered). The contrast measure here is simply the ratio of CI population to the whole population. As explained earlier, extensional population is composed of large cohorts of categorically different businesses. Different businesses in the category often have different interpretation about the meaning of the CI label. Increasing number in extensional population simply indicates that the label is more confusing and creates a lack of consensus among audience members. The opposite is true for *CI population*, the higher the relative density, the greater the consensus for the label. Therefore by capturing the degree of CI population standing out against the whole population, the contrast measure reflects the varying level of agreement in the audience segment about the meaning of the CI label (see Figure 5.2) at different points in its life history. It is worth noting that two types of contrasts are used here as measures of legitimation level: *(classic) contrast* and *weighted contrast*. The former refers to the ratio of density of CI population to that of the whole population. The latter follows the same logic, but uses weighted density in the calculation, i.e., it is the ratio of weighted density of CI population to weighted density of the whole population (explanation of calculation for weighted densities is given in section 5.6).

It can be seen from the Figure that both types of contrast display a similar trajectory of evolution: decrease – jump – then decrease again. A key difference is that the weighted contrast curve amplifies the differences between low and high level of contrast than (classic) contrast do. They also differ on timing of decline: weighted contrast exhibits a delayed course of decline. Most importantly, the figure shows that the average level of both contrasts of CI population is relatively low, suggesting that the population throughout history is rather fragmented. Consistent with contrast-dependence theory, I propose that such heterogeneity inhibited the development of consensus with respect to the CI label, and thus hampered the very legitimation of the underlying form.

Figure 5.2 Contrasts of CI Population



The contrast formulation proposed by Hannan et al. (2007) implicitly suggests that the impact of contrast on legitimation is time independent, i.e., higher level of contrast always favours legitimation. It follows that, holding constant the numbers of those members with higher GoM, a proliferation of marginal members of a population will lower its legitimation by at least some small increment, since it decreases the contrast and makes the population more elusive in the eyes of audience segments. In the real business world, however, the timeless assumption of positive contrast dependence probably requires a second thought. In my view, different level of contrast might work differently on legitimation during different stages of population life. In particular, decreasing contrast might not necessarily hamper legitimacy during a population's youth. As a preliminary argument, I suspect that a further increase of organizations with higher GoM may not be favourable to existing organizations in the population, if one of the following scenarios is met: when the contrast of a population which is at its initial stage of operation happens to be high or, when a population with low level of contrast is aged. Because environmental resources in either case are likely to be strained, a further increase of members with high GoM in such a scenario could easily exhaust the scant resources and intensify competition, at least in the short term.

The negative relationship between contrast level and vital rates is observed in some empirical studies, though limited. For instance, in Bogaert et al.'s (2006) study of legitimation of Dutch audit industry in the 19th century, contrast level of the industry dropped significantly during the early thirty years of population history. In the meantime, however, founding rates of auditors consistently kept rising. The same pattern also can be found in my CI population. In early years of the population, there is a negative relationship between contrast and foundings of CI firms - level of contrast drops while foundings increase (see Figure 4.2, and 2.1 in Chapter 2). Moreover, contrast level started to drop again in 1999 when entry of CI firms accelerated. The inconsistent pattern of contrast dependence prompts me to ask: does the theory of contrast dependence hold? What are the mechanisms behind such an inconsistency that affect organizational legitimation?

5.3 Dynamic Resource Constraints

To deal with the decreasing dependence of legitimacy and competition on density, Hannan (1997) proposed a model in which the effects of legitimation and competition as driven by density on the failure rate are allowed to decline with population age. A set of interactions between density and population age is introduced to capture the decreasing effects of density on organizational vital rates as organizational populations reach maturity. I adopt the modelling framework here but with some adaptations. In line with the fuzzy-set construction, the temporal heterogeneity of legitimation and competition process is now related to population contrast, rather than density. In particular, I suggest that varying level of contrast at different points of population history may work differently on organizational vital rates.

Understanding how environmental resources change as a function of population dynamics is important in answering why there are inconsistencies in contrast-dependence theory. In the evolution of organizational populations, environmental resource availability is simply a matter of life and death for all organizations in the domain. Organizations need resources such as financial capital, skilled employees, technology knowhow, etc to be founded and grow. Environmental conditions often

change substantially over the evolutionary history of organizational populations (Aldrich 1979; Brittain and Freeman 1980). As a population approaches its carrying capacity[32], a greater portion of available resources is consumed by incumbent organizations, the niche becomes more densely packed, it will be much harder for new comers to attract resources, and therefore founding rates should decline.

Received ecological theories treat the environment as exogenous. The implicit assumption is that environment influences populations unilaterally (i.e., it do not assume the other way around). It also presumes that the level of environmental resources remains constant over a population's history, as such carrying capacity of environmental in available ecological models is often regarded as a fixed limit gradually approached by population from below. Such an assumption, however, is often problematic given that ecological study typically involves a long span of historical time. In fact, it is difficult to imagine that organizational populations cannot exert influences on environment in which they are embedded. In my view, it would be more realistic to view the relationship between the environment and its population members as kind of mutually adaptive.

How the environment influences its population members is well studied in organizational ecology (Hannan and Freeman 1977; Aldrich 1979; Carroll and Hannan 2000), however, how populations change their environment is relatively unaddressed. In their evolution paths, organizational populations can and do generate resources which in turn change their environmental conditions. For instance, as a population grows and becomes more cognitively legitimated, it generates cohorts of trained employees, managers, as well as customers. The growth of skilled human resources and customer base makes it easier for new organizations to start up. As legitimacy grows, organizations will also find it easier to access a wide variety of vital resources, such as venture capital, government support, fiscal incentives, etc. Growth of legitimacy can also foster customer goodwill and build industry reputation. In these and other ways, the environmental resource pool coevolves with legitimacy of the

[32] Borrowed from bioecology, the term of carrying capacity in organizational ecology is normally defined as the maximum density of organizations that can be supported by the environment. In other cases, it is sometimes defined in terms of population mass (the aggregate size of the organizations in the population) (see Barnett and Amburgy 1990; Barron 1999). In the context of CI population, since the concentration level in the market is fairly low, the former definition of carrying capacity is adopted here.

population. Obviously, more legitimated populations are likely to enjoy more abundant resources than less legitimated populations do. Higher level of resources, clearly, leads to a larger size of carrying capacity that can be sustained by the environment.

The above argument claims that populations do not just adapt to the changing environment, they also actively influence it by producing mass of resources. The resource producing process probably requires a further deliberation. In line with fuzzy-set construction, I speculate that not every firm in the population produces resources that are relevant to other organizations in the population. In particular, I suggest that organizational members with higher grade of membership (GoM) generate more resources in the underlying form than members with lower GoM. It is also possible that marginal members may not produce any resources that are relevant to other organizations in the form at all.

Why? As explained in Chapter 4, marginal members in the real world often have low GoM in one form but fit comfortably in another. For example, in the form of "university", it can be argued that marginal members such as University of Phoenix and Hamburger University of McDonald's have high GoM in the form of "distance education" and "employee training school", respectively, though both of them fit poorly in the university form. Because environmental resources in many cases tend to be unique and exclusive for the underlying form, the resources generated by such marginal university members may contribute greatly to the legitimation of the population in which they enjoy high GoM, but have little value to other members in the university form.

Moreover, if marginal members further proliferate and reach a certain threshold, I argue that such proliferation not only has little contribution to the expanding of the resource pool of the underlying form, in fact, it may negatively affect existing resources. Why? Because it would lead to an even lower intensional consensus about the underlying form, i.e., the population will be more elusive in the eyes of audience segments. Thanks to low level of aggregate intrinsic appeal of the form, resource availability is likely to shrink as a result. For instance, customer demand should decline; investors will be shy away; trained employees are more likely to exit to

another industry, etc. In other words, carrying capacity of the environment is likely to shrink as a consequence of decreasing contrast level.

In a detailed simulation work conducted by Lomi et al. (2005) about population dynamics, above speculations about dynamic carrying capacity are largely confirmed. Lomi et al. (2005) proposed a "system-dependent selection" framework in which two mechanisms were introduced: dynamic resource constraints and delayed adjustment to the changing resources. The former mechanism indicates there is a feedback connection between population density and resource constraints which in turn allows carrying capacity to vary over time, whereas the latter makes a number of evolution trajectories possible. They suggested that organizations not only consume, but also actively produce resources that other organizations can then use. Nevertheless, the population in their simulation is a crisp set, i.e., they did not differentiate resources generated by organizations with different level of GoM. Their simulation results support their argument that dynamic resource constraints can better explain the wide variety of dynamic behaviours (e.g., sustained oscillations, resurgence, and extinction) that typically followed by mature organizational populations.

5.4 Contrast, Carrying Capacity, and Age Dependence

Following the argument of dynamic resource constraints, I speculate the carrying capacity of CI population is endogenous, i.e., it can be regenerated over time. Different to Lomi et al. (2005)'s system-dependent model, however, carrying capacity here no longer depends on population density, rather, it changes with level of contrast and population age. As explained earlier, I suggest that there is a positive relationship between the level of population legitimation and the size of the carrying capacity of the environment. When the population is less legitimated, it is relatively unknown to external audiences. Such situation makes organizing difficult, e.g., suppliers and customers need to be educated; financial capital might be hard to raise; employees are difficult to identify and recruit, etc. Such unfavourable situations likely make resources scarce in the population, which in turn limits the carrying capacity that the environment can support. However, when the population becomes cognitively

legitimated, it gains the status of taken-for-grantedness. Its cultural and social standing is widely accepted by relevant audiences. The development of resource pool in the meantime will be significantly stimulated. The more abundant the resource pool is, the higher the carrying capacity will be.

Contrast dependence model (Hannan, Pólos et al. 2007) suggests that increase of average contrast of the population always favours legitimation of the underlying organizational form. However, I argue that it depends on the level of contrast at the time and corresponding population age. It has been widely agreed in available ecological theories that a new organizational population in its early years of history is very unlikely to be legitimated[33], which suggests that the environmental carrying capacity during a population's youth is usually small in size. On the one hand, if the contrast level is low when the population is young, I speculate that low-level increases in contrast, in line with contrast dependence theory, will have positive legitimation impact on the population. The reasoning is straightforward. Initial increases of members with high GoM facilitate development of extensional and intensional agreement about the new-born label among audience segments, which are keys for the formation of a legitimated organizational form. Though carrying capacity is small in size, population density in its early years also tends to be small. It is unlikely that low-level growth of members with high GoM will hit resource constraints. Therefore legitimacy should increase with level of population contrast.

On the other hand, as time passes, if the population somehow fails to get the desired legitimation status at a later stage of its life (i.e., the average contrast level is still rather low), increases in contrast do not necessarily facilitate legitimation. Quite on the contrary, such increases may stimulate competition. Why? First of all, as the population grows old, overall density is likely to be significantly increased (including those firms with high GoM). Second, as argued earlier, organizations with lower GoM generate much less (or even irrelevant) resources than those with higher GoM do. If contrast level is low as the population ages, overall resources produced by organizations, comparing to its increased population size, are very limited. Given the

[33] There are exceptions, however. For example, Boone et al. (2000) argued that the population of auditing firms might inherit legitimation from the well-established population of accounting firms. Nevertheless, in the context here, I don't see such legitimacy spillover happened in the CI population.

strained resources, a further increase of population members with high GoM is likely to intensify competition pressure and overshoot the small carrying capacity, at least in the short term. Although it is possible that the influx of members with high GoM should generate relevant resources and create a more favourable environment, such a process however, usually takes years to come. Before the created resources being eventually materialized, the competitive pressure should remain high in the environment.

Note that above scenarios ignore the possibility that increasing contrast could also mean a drop of density for marginal members (with low GoM) in the population. Such negligence requires a further deliberation. As explained in Chapter 4, in a population where legitimation level is low, marginal members have a lesser degree of competitive pressure than those with high GoM, therefore an increase of contrast level here refers to an influx of members with high GoM (i.e., ignoring the possibility of marginal members dropping out of the population).[34] In both scenarios, an increase of contrast when the population with low contrast level is aged tends to discourage founding rate and stimulate competition in the population, at least in the short term. Moreover, I argue that above speculation of legitimation and competition impact is supposed to be especially salient on central members of the population, i.e., those with high GoM, since they are the key members in the underlying form that compete for legitimacy. Hence, by applying above arguments in the CI population, I have following predictions:

Hypothesis 5.1: *Low-level increase of contrast of CI population (low contrast) during the population's youth will first increase the founding rates of CI firms (that carry CI label in company names), then decrease at a later stage as the population ages*.

Hypothesis 5.2: *low-level increase of contrast of CI population (low contrast) during the population's youth will first decrease the failure rates of CI firms (that carry CI label in company names), then increase at a later stage as the population ages*.

[34] Note that I did not claim that marginal members do not fail when the population is not legitimated. I merely argue that if marginal members fail, they fail at a slower rate than those with high GoM. Therefore increasing contrast here is only possible through the influx of members with high GoM.

Next I turn to the situation when population contrast level is high. Increasing contrast when population is young is commonly thought to have legitimation impact on the whole population. However, I argue that it is the level of initial population contrast that matters. If the contrast level happens to be high, i.e., its boundary is relatively sharp at the outset of a population, further increases of contrast will not necessarily favour legitimacy. When the population is young, it usually lacks status of legitimation. In other words, carrying capacity is supposed to be small in size. Though concentration of members with high GoM tend to produce resources that other members can then use, such resources, however, are difficult to materialize in early years of population life. For instance, employees need time to be trained, customers need time to be educated; governmental supports need time to win over, etc. Since the associated form is largely unknown to external audiences, demand of the service is likely to be small. Moreover, organizational members with relatively high GoM are similar to each other, either in terms of feature values or organizational niche. They appeal to the same sort of limited resources. When resources are scarce, a conglomeration of members with high GoM is unlikely to be favourable for organizations in the form. Therefore, a further increase of contrast level is likely to intensify competition - even the population is still very young[35].

As time passes, if members with high GoM continue to proliferate and reach a certain threshold beyond which collective identity of the new form begins to be recognized and accepted by audience segments, an increase of contrast in such scenario, as I speculate, would further stimulate entry and depress failure rates of the population. There are two possibilities for increasing contrast here. First, during early stage of legitimation, increasing contrast can either be influx of members with high GoM, or dropping out of marginal members. In line with contrast-dependence theory, increasing contrast in both cases should increase overall legitimation level. Moreover, a relatively legitimated environment means that the carrying capacity is significantly expanded, which in turn allows coexistence of a large number of firms without triggering immediate competition mechanism. Second, if the population reaches its maturity and is highly legitimated, density-dependence theory holds that entries should fall and

[35] Again, an increase of contrast level in this scenario refers to influx of member with high GoM (i.e., ignoring the possibility of marginal members dropping out of the population), since the competitive pressure is lower for marginal members than those with high GoM when the legitimation level of the population is low.

failure rates should increase. Therefore, an increase of contrast in such scenario is more likely to be a drop of density for marginal members, since in a legitimated population marginal members expose to higher level of competitive pressure than those with high GoM (as proved in Chapter 4). Given the favourable environment, the resources released by marginal members (though limited) should encourage entry of new firms, and alleviate competitive pressure of the population. However, due to the fact that the population is already sufficiently legitimated and the resources released by marginal members are supposed to be thin, the legitimation effect induced by increasing contrast in such scenario, as I speculate, would be very small.

It is worth noting that the above argument appears to conflict with density-dependence theory. Density-dependence theory holds that founding rates should fall and exit rates should increase if the population is highly legitimated, whereas my argument suggests a story to the contrary. However, there is a fundamental difference between the two stories. My argument takes fuzziness in membership into consideration, while density-dependence theory does not. Therefore, they are not necessarily in mutual exclusion. In fact, by taking fuzziness into account, my argument can still be neatly integrated into the density-dependence framework. For instance, in the fuzzy-set construction, while the overall exit rate is high as the population reaches maturity, it is still possible for members with high GoM to exhibit a lower level of failure rate, because marginal members tend to exit at a rate much higher than their counterparts.

To sum up, I argue that as the number of firms with high GoM reaches a certain threshold and overrides the initial competition effect, increasing contrast will have a monotonic effect on legitimation of the population. Hence, I posit that:

Hypothesis 5.3: *High-level increase of contrast of CI population (high contrast) during the population's youth will first discourage the founding rates of CI firms (that carry CI label in company names), then increase at a later stage as the population ages*.

Hypothesis 5.4: *High-level increase of contrast of CI population (high contrast) during the population's youth will first increase the failure rates of CI firms (that carry CI label in company names), then decrease at a later stage as the population ages*.

Predictions of proposed hypotheses from 5.1 to 5.4 are summarized in following table:

Table 5.1 Predictions of Proposed Hypotheses

CI population age →

Contrast level →	Young		Aged	
	Entry	Exit	Entry	Exit
Low	H5.1a +	H5.2a -	H5.1b -	H5.2b +
High	H5.3a -	H5.4a +	H5.3b +	H5.4b -

5.5 Empirical Specifications and Covariates

The main dependent variables in this Chapter are the organizational founding rate and failure rate of CI firms in Shenzhen. As defined in Chapter 3, a firm's first date of bearing the label of "corporate identity" in its corporate name signifies its entry into the CI population, whereas its exit date is recorded when it disbands or exits to another industry. I identified 1,663 firms that entered the CI population. The count began in November 1992 and covered all the firms that ever existed in the population up to May 2007. Over the history of CI population, there were 852 disbanding or industry exits, i.e., over half of firms ended their venture in the CI market in the short history of the industry. The entry models were based on monthly counts of CI firms entering the market. Variables were updated every month, the only exception being annual measure of GDP of Shenzhen, for which monthly data were not available. For exit models, I use organizational age as the clock variable based on which the hazard is estimated. Covariates were updated every given day by using the exact life information of each firm in the population and were converted into decimal numbers.

The independent covariates were classified into two major groups: population-level and firm-level, as specified below. In entry models, as per convention in ecological analysis, all independent covariates were lagged by one observation period. In exit

models, however, the lagging is not necessary and inappropriate in the CI context, therefore non-lagged values are used.

Population-level and environmental variables

Population Density. Although density does not figure in my hypotheses, it's an important independent variable in this study, since it constitutes the basis of contrast measures. I used the life-history information on firms to construct two major densities of interest, namely, density of CI population and density of the whole population. The two variables measured the total number of firms of a particular type that are active in a given time period. In line with conventional ecological specifications, a second order, quadric version of density is included in the model to account for non-monotonic effects on vital rates.

Weighted density. Apart from traditional density measures, I also include a fuzzy density to capture the fragmentation status of the whole population. Recall that the whole population consists of a wide variety of diverse organizations that belong to 59 categories (58 categories in the extensional population plus the CI population). Many of them interpret the CI concept differently from CI firms. As argued earlier, the various blueprints of these categories muddy the water of CI business. They make the underlying form of "corporate identity consulting" elusive for audiences and eventually undermine its legitimation. The fuzziness of various schema used for the emergent CI form can be estimated by using the membership distribution of different categories in the population. This leads to a weighted density count, which is calculated as follows[36]:

$$WeightedDensity_t = \sum_{i=1}^{n} \frac{N_{it}}{N_t} \times N_{it} \qquad (5.1)$$

where N_t is the number of organizations in the whole population at time t, and N_{it} represents the organizational density of category i at time t. It is evident from the formula that the weighted density of a particular category reflects the relative salience

[36] The method of calculating *weighted density* in order to get insight into the fuzzy status of a population has earlier been adopted by Bogaert, et al. (2006) in a study of Dutch audit industry in the 19th century.

of the category in the population. Obviously, the authority of a category for interpreting the CI concept increases with its weighting in the population. In case all firms are equally distributed into different categories, I suggest that this is a situation where substantial ambiguity exists about the concept of "corporate identity consulting". Using the above ideas I constructed two weighted density measures: *weighted CI density* and *weighted whole density*. The former refers to CI population, whereas the latter is for the whole population. Referring back to above formula, *n* is set to 1 for the weighted CI density, and 59 for the weighted density of the whole population.

Contrast. This is the major variable of interest in this Chapter. As explained earlier, the intensional consensus for the CI concept increases with the relative density of CI population in the whole population. The higher the density of the CI population, the sharper the boundary of the concept will be. Two variables are measured here: (classic) contrast and weighted contrast. The former refers to the ratio of density of CI population to that of the whole population, whereas the latter equals the ratio of weighted density of CI population to weighted density of the whole population. By capturing the degree of CI population standing out against its background, the two contrast measures explicitly reflect the time-varying legitimation level of the concept. Nevertheless, it is worth noting that the former contrast treats the extensional population as a homogeneous set, while the latter takes into account the fragmentation of the extensional population, and therefore should represent a more accurate count of the contrast status at any given point of historical time. Finally, as both of the contrast measures are proportions, I normalize both variables in analysis using an arcsine transformation (Zar 1999):

$$\text{Contrast}' = arcsin\sqrt{Contrast} \tag{5.2}$$

It is worth noting that the results obtained by using the above transformation are similar to those provided using the straight proportion measures.

Lagged foundings. The number of foundings in the previous year was also included into the models, since many previous researches indicate that lagged foundings affect founding rates net of the effects of density and covariates (Delacroix and Solt 1988;

Ranger-Moore, Banaszak-Holl et al. 1991; Mezias and Mezias 2000). Delacroix and Carroll (1983) found that this effect was quadric: the first order effect of lagged foundings encourages founding rate, while the second order effect discourages it. They interpreted the positive effect as indicating "contagion" in the process, and the negative effect implies that too many foundings in a previous period temporarily exhaust the finite resources. To test this possibility, both first- and second-order effects of lagged foundings were added into the models.

Population age. Population age was defined as the time elapsed (in years) since the first founding of CI firm in June 1992. In my model specifications it is the control variable that interacts with the first- and second-order terms of contrasts.

GDP. In order to capture the general trends of economic conditions in Shenzhen, the gross domestic products of Shenzhen between 1984 and 2007 were also added into the models. The variable is a useful indicator of business cyclicality for local firms. It was updated every year.

Firm-level variables

In exit models, I measured following firm-level covariates. *Organizational age* is usually a measure of tenure for a particular organization. Tenures in the CI population were calculated based on the exact timing information of entry and exit of each firm and were converted to decimal numbers. In order to account for the conditions at founding, I also included a time-invariant variable measuring d*ensity at founding*. Carroll and Hannan (1989) argued that density at founding has a persistent effect on mortality rates and that organizations founded during period of high density have higher mortality rates at all ages. The hypothesis was later confirmed by a number of empirical studies (Swaminathan 1996; Lomi and Larsen 1998). I added the variable to test this possibility.

To test McKendrick et al. (2003)'s argument that increasing density of *de alio* organizations discourages population legitimation (because they hamper the formation of a collective identity of the associated form), I added a dummy variable to indicate *de alio* status. The variable took the number of one when the entry-date of a firm is

different from its registered date (see Chapter 3 for explanation) and zero otherwise. I also constructed a time-fixed variable recording the *population age at entry* for CI firms, it was used as a control for possible effects of population aging in the CI market. In addition, to account for the effects of increasing categories in the extensional population, I included a time-varying variable calculating the cumulated number of categories at different points of population life.

Finally, as in Chapter four, I also included two control variables: *firm size* and *financial crisis*. The former measures the size of CI firm in each year of operation, using the registration capital reported by CI firms. The inclusion of the latter is to capture possible effect of financial crisis that erupted in Southeast Asia in the late 1990s. It is set to one for years 1997-1998 and zero otherwise. For a detailed explanation of the two covariates, readers can refer back to Chapter four.

Tables 5.2 and 5.3 summarize the descriptive statistics for variables used in both the entry and exit modes. Correlations can be found in Appendix A5.2.

Table 5.2 Descriptive Statistics for CI Firm Founding/Entry Models

Variable	Min	Max	Mean	Std. Dev.
Lagged entries	0.00	38.00	9.26	8.12
(Lagged entries)^2 ×10^{-2}	0.00	14.44	1.51	2.27
GDP (ten billions)	3.17	68.02	24.36	17.60
Whole density (N_w) ×10^{-2}	0.10	113.84	37.16	33.82
CI density (N_c) ×10^{-1}	0.10	99.50	41.85	35.32
Weighted whole density (N_{ww}) ×10^{-1}	0.38	66.23	29.79	20.02
Weighted CI density (N_{wc})	0.07	137.61	51.47	44.40
Population age (T)	0.00	14.83	7.42	4.32
Contrast ($C=N_c / N_w$)	0.02	0.17	0.10	0.05
T × C	0.00	1.61	0.84	0.59
C^2	0.00	0.03	0.01	0.01
T × C^2	0.00	0.24	0.11	0.09
Weighted contrast ($C_w= N_{wc} / N_{ww}$)	0.00	0.27	0.13	0.10
T × C_w	0.00	2.93	1.24	1.04
C_w^2	0.00	0.07	0.03	0.03
T × C_w^2	0.00	0.77	0.25	0.26

Note: Number of CI firms' foundings: 1663; number of firms in the whole population: 16,450; number of spells: 179 months.

Table 5.3 Descriptive Statistics for CI Firm Disbanding/Exit Models

Variable	Min	Max	Mean	Std. Dev.
Firm size	0.05	11.18	3.75	1.54
GDP	0.23	68.02	45.71	19.36
Financial crisis	0.00	1.00	0.07	0.25
De alio CI firm (dummy)	0.00	1.00	0.01	0.07
No. of categories	1.00	59.00	55.52	6.70
Population age at entry	0.00	14.93	9.07	2.86
CI firms density at founding	0.00	101.10	5.30	18.65
Whole density (N_w) $\times 10^{-2}$	0.00	114.28	75.69	35.61
CI density (N_c) $\times 10^{-1}$	0.00	101.10	71.25	24.65
$N_c^2 \times 10^{-4}$	0.00	102.21	56.84	26.34
Weighted whole density (N_{ww})	0.00	665.73	500.50	163.89
Weighted CI density (N_{wc})	0.00	139.38	73.39	31.52
$N_{wc}^2 \times 10^{-3}$	0.00	19.43	6.38	4.73
Population age (T)	0.00	15.26	11.79	3.38
Contrast (C=N_c / N_w)	0.00	16.72	10.25	3.59
$T \times C$	0.00	161.87	117.37	34.21
C^2	0.00	2.79	1.18	0.76
$T \times C^2$	0.00	23.93	12.90	6.65
Weighted contrast (C_w= N_{wc} / N_{ww})	0.00	2.71	1.50	0.73
$T \times C_w$	0.00	29.56	17.37	7.41
C_w^2	0.00	0.73	0.28	0.23
$T \times C_w^2$	0.00	7.85	3.09	2.37

Note: Number of CI firms: 1,663; number of CI firms' failures: 852; number of spells (CI firm age years): 2,262.

5.6 Modelling Strategy

The traditional model of density dependence holds that legitimation is a function of increase in low density, while competition is triggered by an increase in high density. In empirical settings, organizational founding rates are modelled as a log-linear quadratic function of density $\lambda_t = l_t exp(\alpha_1 N_t + \alpha_2 N_t^2)$. Following a similar notation, the disbanding rates are specified as $u_t = c_t exp(\beta_1 N_t + \beta_2 N_t^2)$. Density dependence model was later modified by Hannan (1997). He suggested that when density declines from an observed peak, density-driven process is better modelled as time variant. The new specification adds interactions of population age with the linear and squared terms of density. Coefficients of the interactions are expected to oppose those predicted for the

main effects, which allows the dependence of vital rates on density to decline with population age. Specifically, legitimation and competition were reformulated as $\lambda_t = l_t exp[\alpha_1(t)N_t + \alpha_2(t)N_t^2]$, and $u_t = c_t exp[\beta_1(t)N_t + \beta_2(t)N_t^2]$, respectively.

I adopt Hannan (1997)'s modelling framework here, but with some adaptations. Since density plays no role in my hypotheses, adapting my theory to the revised model requires the addition of time-varying contrast effects. Legitimation is now specified a

$$\lambda_t = l_t exp(\alpha_1 C_t + \alpha_2 tC_t + \alpha_3 C_t^2 + \alpha_4 tC_t^2) \quad (5.3)$$

where λ_t is the founding rate at time *t*; C_t is the contrast level at time *t*; $\alpha_1, \alpha_2, \alpha_3$, and α_4 are parameters to be estimated; and l_t is the term summarizing the effects of exogenous conditions on the organizational founding rate. Based on my hypotheses, I expect that

$$\alpha_1 > 0, \ \alpha_2 < 0, \ \alpha_3 < 0, \text{ and } \alpha_4 > 0 \quad (5.3a)$$

Consistent with my predictions about resource competition at different level of contrast, the baseline model specification for time-varying failure rate is

$$u_t = f_t exp(\beta_1 C_t + \beta_2 tC_t + \beta_3 C_t^2 + \beta_4 tC_t^2) \quad (5.4)$$

where u_t is the individual failure rate at time *t*; C_t is the contrast level at time *t*; $\beta_1, \beta_2, \beta_3$, and β_4 are parameters to be estimated; and f_t summarizes the effects of exogenous conditions on the organizational failure rate. My hypotheses predict that

$$\beta_1 < 0, \ \beta_2 > 0, \ \beta_3 > 0, \text{ and } \beta_4 < 0 \quad (5.4a)$$

Similar with Hannan (1997)'s temporal heterogeneity model, I expect signs of the interactions of population age with contrast and contrast squared to oppose those predicted for the main effects. There is an important difference, however. In particular, I expect relationship between contrast level and the multiplier of the vital rates to be

entirely overturned in later years of the population, rather than weakened as predicted in Hannan's (1997) model[37].

In tests of hypotheses, founding rate and failure rate of CI firms are analyzed by using negative binomial regression model and piecewise exponential model, respectively. Models are estimated using method of Maximum Likelihood as implemented in STATA 9.2. For a detailed explanation of research methods chose here, readers can refer back to Chapter 3.

5.7 Results

Organizational founding/entry analysis

Table 5.4 reports the first set of founding rate models for CI firms in Shenzhen. Model 1 represents a baseline model with the lagged foundings and GDP. In line with conventional ecological findings, there is a strong quadric effect for the lagged foundings: low level of recent founding events drive the founding rate of CI firms, indicating a "contagion" process, while too many recent foundings will depress the founding rate, because finite resources necessary for additional foundings of CI firms have been temporarily exhausted. Model 2 includes the density variable for the whole population. The variable exhibits a strong negative effect on founding rate of CI firms. As explained earlier, the whole population consists of a wide variety of categorically diverse firms. The negative effect could be viewed as the result of increasing fragmentation of the whole population. The entries of categorically different firms make the concept of "CI" vague for relevant audiences which in turn depress the entry rate of CI firms. Model 3 turns to the weighted density measure, again for the whole population; model fit improves significantly over Model 1 (Haberman's χ^2=19.14; Δd.f.=1; p<0.01). The weighted density, which explicitly takes into account the fragmentation of the population, exhibits a strong positive effect on CI firm entries.

[37] Hannan's (1997) complete model also includes interactions between the square term of population age with density and density squared. These interactions capture what Hannan refers to as a "resurgence effect" of density, i.e., late in the population's history, organizational proliferation increases again. The complete model however, unlike my specification here, never allows relationship between density and vital rates to go overturned at any stage of the population life.

Table 5.4 ML Estimates of Negative Binomial Models of Founding/Entry Rates of CI firms, 1992-2007

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Lagged entries	0.193***	0.191***	0.135***	0.129***	0.148***
	(0.017)	(0.017)	(0.021)	(0.019)	(0.019)
(Lagged entries)^2 $\times 10^{-2}$	-0.392***	-0.391***	-0.258***	-0.252***	-0.294***
	(0.053)	(0.052)	(0.059)	(0.054)	(0.055)
GDP	0.011***	0.078***	-0.042***	-0.006	-0.003
	(0.003)	(0.021)	(0.012)	(0.007)	(0.004)
Whole Density (N_w) $\times 10^{-2}$		-0.035***			
		(0.011)			
Weighted whole density (N_{ww}) $\times 10^{-1}$			0.054***		
			(0.013)		
CI density (N_c) $\times 10^{-1}$				0.045***	
				(0.008)	
$N_c^2 \times 10^{-4}$				-0.035***	
				(0.006)	
Weighted CI density (N_{wc})					0.021***
					(0.005)
$N_{wc}^2 \times 10^{-2}$					-0.011***
					(0.003)
Constant	0.448***	0.116	0.426***	0.364***	0.461***
	(0.131)	(0.169)	(0.130)	(0.140)	(0.132)
Obs. (No. of months)	179	179	179	179	179
Log-likelihood	-505.81	-500.56	-496.24	-489.01	-496.12
LR $\chi^2_{(d.f.)}$	$162.76_{(3)}$	$173.27_{(4)}$	$181.90_{(4)}$	$196.36_{(5)}$	$182.14_{(5)}$
Haberman's χ^2 (vs. models)		$10.51^{***}_{(1)}$	$19.14^{***}_{(1)}$	$33.60^{***}_{(1)}$	$19.38^{***}_{(1)}$

Note: Standard errors in parentheses
* p<0.05; ** p<0.01%; *** p<0.001

In Model 4, I turn to the effects of own density of CI firms on the population. I add the first- and second-order terms of CI density; again, model fit improves significantly (over Model 1). Consistent with predictions of density dependence theory, the effect of density on the entry rate of CI firms is non-monotonic and inversely U-shaped. Model 5 reveals what happens when I enter both linear and quadric terms of weighted CI density. Model fit improves over Model 1 as indicated by the likelihood ratio test (Haberman's χ^2=19.38; Δd.f.=1; p<0.001). In this model effects of weighted CI density continue to be inversely U-shaped, with coefficients smaller than the classic density effects (Model 4).

Table 5.5 ML Estimates of Negative Binomial Models of Founding/Entry Rates of CI firms, 1992-2007 (continued)

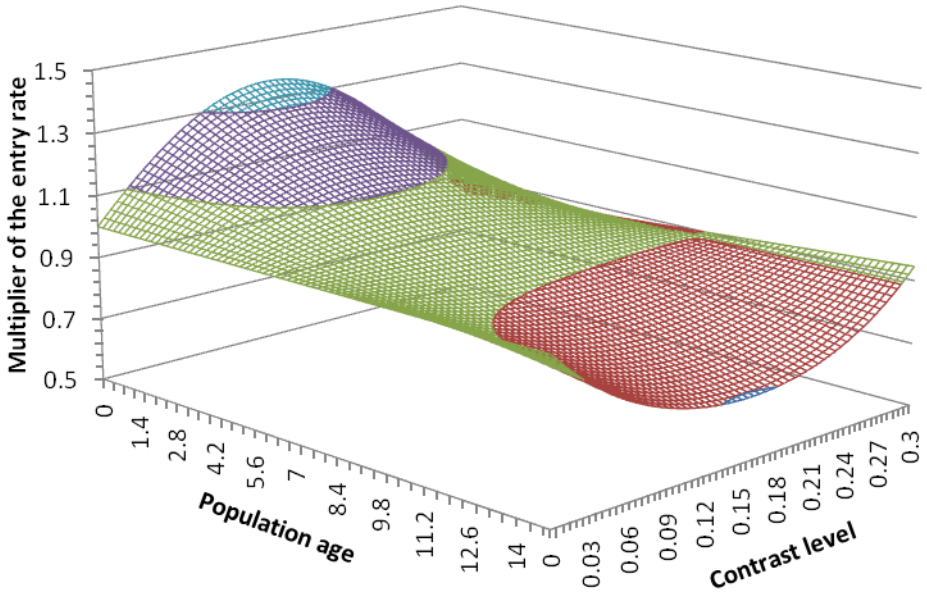
Variable	Model 6	Model 7	Model 8
Lagged entries	0.099***	0.068***	0.040**
	(0.020)	(0.020)	(0.020)
(Lagged entries)^2 $\times 10^{-2}$	-0.192***	-0.118**	-0.061
	(0.055)	(0.056)	(0.055)
GDP	-0.083***	-0.084***	-0.071***
	(0.013)	(0.017)	(0.017)
Population age (T)	0.448***	0.789***	0.738***
	(0.062)	(0.154)	(0.101)
Contrast ($C = N_c / N_w$) $\times 10^2$		0.663***	
		(0.168)	
$T \times C \times 10^2$		-0.076***	
		(0.028)	
$C^2 \times 10^2$		-3.312***	
		(0.918)	
$T \times C^2 \times 10^2$		0.368***	
		(0.141)	
Weighted contrast ($C_w = N_{wc} / N_{ww}$) $\times 10^2$			0.464***
			(0.075)
$T \times C_w \times 10^2$			-0.062***
			(0.010)
$C_w^2 \times 10^2$			-1.735***
			(0.310)
$T \times C_w^2 \times 10^2$			0.215***
			(0.035)
Constant	-0.097	-2.528***	-1.528***
	(0.155)	(0.645)	(0.296)
Obs. (No of months)	179	179	179
Log-likelihood	-479.77	-469.41	-458.37
LR $\chi^2_{(d.f.)}$	$214.84_{(4)}$	$235.57_{(8)}$	$257.65_{(8)}$
Haberman's $\chi^2_{(vs.\ models)}$	$52.08^{***}_{(1)}$	$20.73^{***}_{(6)}$	$42.81^{***}_{(6)}$

Note: Standard errors in parentheses
* p<0.05; ** p<0.01%; *** p<0.001

Table 5.5 presents the second set of founding rate models for CI firms that test Hypotheses 5.1 and 5.3. Model 6 includes population age of CI firms. Apparently, founding activities of CI firms significantly increased as the market matured. Model 7 includes four terms of population contrast. Model fit improves significantly over Model 6 ($\chi^2[L_7\text{-}L_6]$= 20.73 with p<0.001 for 4 d.f.). The estimated nonmonotonic (positive changing to negative) effect of linear contrast and age-dependent linear contrast on the entry rate of CI firms offers strong support for Hypotheses 5.1 (i.e., when the contrast level is low). The estimated effect (negative changing to positive) of the two squared contrasts (age-independent and age-dependent) on the entry rate offers

support for Hypotheses 5.3 (i.e., when the contrast level is high). Model 8 turns to the four terms for weighted contrast measure that, again, test Hypotheses 5.1 and 5.3. Model fit again improves significantly over Model 6 as indicated by the likelihood ratio test ($\chi^2[L_8\text{-}L_6]$= 42.81 with p<0.001 for 4 d.f.). The effects of the age-independent variables change from positive to negative, whereas the coefficients for the interactions between linear and squared weighted contrast and population age run in a direction opposite to the one predicted in the age-independent variables. This finding again supports Hypotheses 5.1 and 5.3.

Figure 5.3 Multiplier of the Entry Rate of CI Firms



To help visualize the results, I employ surface plot to illustrate the patters of effects using estimates from Model 8 in Table 5.5[38]. Figure 5.3 illustrates that during early years of the population, there is a reversed U-shaped relationship between contrast level (plotted within its observed range) and the multiplier of the entry rate. At a later stage of the industry, however, the relationship is changed to U-shaped, i.e., low-level increases in contrast level lower entry rates, and high-level increases raise them, with contrast effect turning from negative to positive at level of 0.2. The surface plot confirms my predictions that relationship between contrast level and entry rate is

[38] As explained earlier, weighted contrast takes into account the fragmentation of the extensional population and should represent a more accurate count of the contrast status, Model 8 is therefore used here for plotting. Furthermore, to ease graphic presentation, I rescaled all coefficients by a factor of 10.

entirely overturned as population matures (cf. Hannan 1997's temporal heterogeneity specification, in which effect of density on the founding rate diminishes as population grows old).

Figure 5.4 Effects of Contrast and Population Age on the Entry Rate of CI Firms

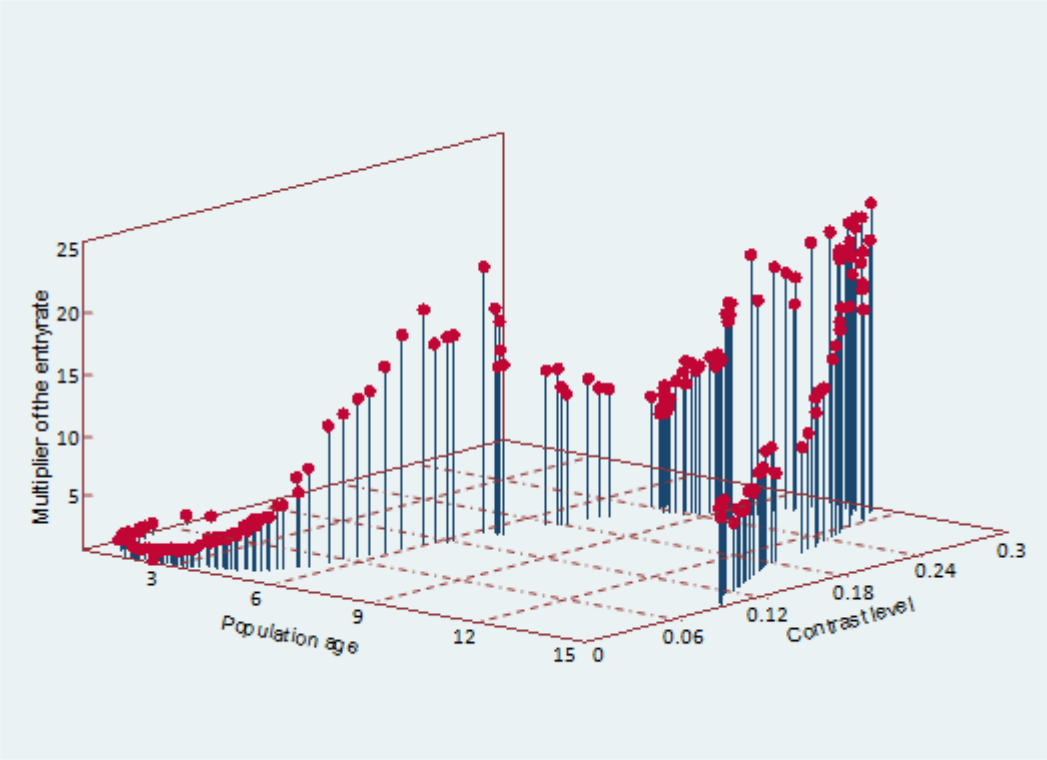


Figure 5.3 provides a straightforward implication of the estimated specification. However, many conditions plotted lie outside of the data range. For example, the combination of very high contrast and very young population age was not obtained historically, and therefore could not have affected the estimate. In order to investigate the portions of the conditions that did affect the estimates, I re-plot the multiplier of the entry rate using the exact information obtained historically. Figure 5.4 contains this scatterplot. The growth of multipliers has traversed a tortuous path of development. When the population is at its very early stage, decreasing contrast leads to a slight but consistent growth of the multipliers. The turning point is at roughly age 3 (that is, 1995 in historical time), contrast level begins to increase sharply. The increased level of contrast in this stage, in line with conventional theory of contrast dependence, results in a jump of the multipliers. The upward trend continues until at about $\mu = 6$ (that is,

1998), when effects of contrast start to contradict predictions of contrast dependence, i.e., increasing contrast brings about a drop of the multipliers. Beginning in about $\mu = 9$ (that is, 2001), contrast starts to have a positive relationship with the multipliers. When contrast reaches its peak, at roughly $\mu = 11$ (that is, 2003), the multipliers drop sharply. The associated implication of such a decline in the multiplier is that density would subsequently decline (as observed in Figure 2.2 in Chapter 2).

Organizational disbanding/exit analysis

Table 5.6 presents the results of the first set of CI firm disbanding/exit estimates. Model 1 offers a baseline of the key firm-specific and population-level factors affecting firm exit. Interestingly, the effect of firm size significantly increases firm exit. It appears that resource partitioning does not operate in the CI market. However, given the nature of the consulting industry, the finding is deemed reasonable, because the industry is typically characterized by decentralization, i.e., organizations usually tend to be small and scale advantage is not particularly an issue. In such case, increasing firm size is unlikely to ease mortality rates of specialist organizations. As expected, effect of GDP significantly decrease CI firms' failure rate. The other four covariates - financial crisis, *de alio* of CI firms, cumulated number of categories, and population age at entry all exhibit a positive and significant effect on firm exit. In Model 2, I include density of the whole population. The effect of the density as a whole significantly decreases CI firms' exit. In Model 3, weighted density of the whole population is entered. Recall that the covariate takes into account the "fuzziness" of the population. It also shows a particularly strong negative effect on firm exit, though the coefficient is smaller than the classic density effect.

In Model 4 I add the first- and second-order terms of CI density. Again, Model 4 significantly improves the fit over Model 1 as indicated by the likelihood ratio test (Haberman's χ^2=24.78; Δd.f.=2; p<0.001). The effect of density on the exit rate of CI firms is non-monotonic and U-shaped, i.e., low-level increases of CI density favors legitimation of CI firms, whereas high-level increases of CI density stimulate competition. Model 5 then turns to two weighted terms of CI density; again, model fit improves significantly over Model 1. Consistent with findings in Model 4, the effect of

weighted density on CI firms' exit is U-shaped, but again, the coefficients are much smaller than that of classic CI density.

Table 5.6 ML Estimates of Piecewise Constant Rate Models of Disbanding/Exit of CI firms, 1992-2007

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Tenure: 0<u<=1	-9.310***	-13.337***	-10.790***	-13.067***	-10.904***
	(1.274)	(1.435)	(1.334)	(1.711)	(1.571)
Tenure: 1<u<=2	-7.800***	-11.857***	-9.353***	-11.554***	-9.395***
	(1.272)	(1.435)	(1.335)	(1.714)	(1.572)
Tenure: 2<u<=7	-5.552***	-9.572***	-7.093***	-9.302***	-7.149***
	(1.273)	(1.433)	(1.335)	(1.716)	(1.574)
Tenure: u>7	-1.706	-5.385***	-2.923**	-5.479***	-3.317**
	(1.327)	(1.470)	(1.386)	(1.755)	(1.622)
Firm size	0.078**	0.105***	0.099**	0.082**	0.078**
	(0.039)	(0.040)	(0.040)	(0.039)	(0.039)
GDP	-0.170***	-0.063***	-0.086***	-0.175***	-0.182***
	(0.006)	(0.015)	(0.011)	(0.006)	(0.009)
Financial crisis	0.755***	1.332***	1.157***	0.364**	0.659***
	(0.175)	(0.195)	(0.182)	(0.182)	(0.188)
De alio CI firm (dummy)	0.330*	0.271	0.309*	0.328*	0.337*
	(0.187)	(0.187)	(0.186)	(0.186)	(0.187)
No. of categories	0.096***	0.155***	0.159***	0.250***	0.150***
	(0.025)	(0.028)	(0.027)	(0.045)	(0.039)
Population age at entry	0.737***	0.766***	0.840***	0.803***	0.766***
	(0.074)	(0.075)	(0.077)	(0.075)	(0.077)
CI firms density at founding	0.010	0.014**	0.006	0.004	0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Whole density (N_w) $\times 10^{-2}$		-0.065***			
		(0.008)			
Weighted whole density (N_{ww})			-0.013***		
			(0.001)		
CI Density (N_c) $\times 10^{-1}$				-0.127***	
				(0.024)	
$N_c^2 \times 10^{-4}$				0.077***	
				(0.015)	
Weighted CI density (N_{wc})					-0.019***
					(0.015)
$N_{wc}^2 \times 10^{-3}$					0.079***
					(0.074)
Obs. (No of spells)	5251	5251	5251	5251	5251
Log-likelihood	-796.17	-761.33	-733.70	-783.78	-784.51
Haberman's χ^2 (vs. model 1)		69.69***	124.94***	24.78***	23.32***
D.f.	11	12	12	13	13

Note: Standard errors in parentheses
* p<0.05; ** p<0.01%; *** p<0.001

Table 5.7 presents the second set of exit rate models for CI firms. Model 6 is the baseline that includes control variables estimated in Model 1 of Table 5.6 and industry age of CI population. Model 7 includes four terms of contrast that test Hypothesis 5.2 and 5.4. The inclusion of the contrast measures significantly improves the fit over Model 6 as indicated by the likelihood ratio test ($\chi^2[L_7\text{-}L_6]$= 151.49 with p<0.001 for 4 d.f.). The coefficients of the linear and squared (classic) contrast changes from negative to positive, providing strong support for the first parts of Hypotheses 5.2 and 5.4 (or H5.2a and H5.4a, see Table 5.1). The signs of the two age-dependent covariates run in a direction opposite to those predicted in the age-independent ones, offering support for the second parts of Hypotheses 5.2 and 5.4 (or H5.2a and H5.4a, see Table 5.1). In Model 8, I turn to the four terms for weighted contrast that again test Hypotheses 5.2 and 5.4. Model fit improves significantly over Model 6 ($\chi^2[L_8\text{-}L_6]$= 156.37 with p<0.001 for 4 d.f.). The model exhibits similar patterns on CI firms' exit as Model 7. Hypotheses are again confirmed by the estimated nonmonotonic effect of age-independent contrasts (negative changing to positive) and age-dependent contrast (positive changing to negative) on the hazard. Though pointing to the same directions as those in Model 7, the sizes of the coefficients of the four terms for weighted contrast are significantly larger than that of (classic) contrasts, suggesting that exit rate of CI firms may be more sensitive to changes in weighted contrast measures.

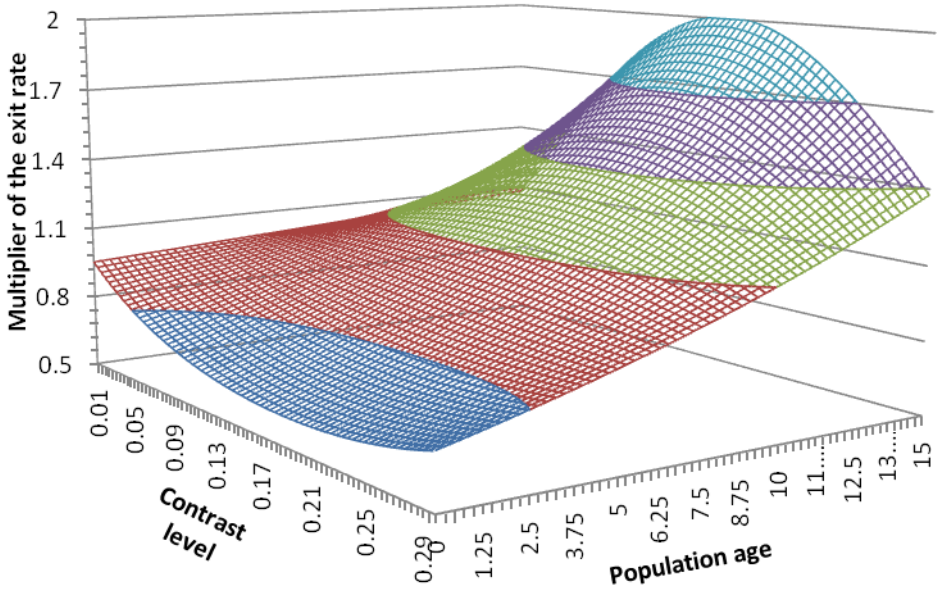
Table 5.7 ML Estimates of Piecewise Constant Rate Models of Disbanding/Exit of CI firms, 1992-2007 (continued)

Variable	Model 6	Model 7	Model 8
Tenure: 0<u<=1	-14.702***	1.380	-2.309
	(1.421)	(1.773)	(1.603)
Tenure: 1<u<=2	-13.170***	2.896	-0.809
	(1.420)	(1.777)	(1.607)
Tenure: 2<u<=7	-10.857***	5.231***	1.528
	(1.418)	(1.779)	(1.608)
Tenure: u>7	-6.685***	9.343***	5.635***
	(1.452)	(1.805)	(1.643)
Firm size	0.099**	0.097**	0.093**
	(0.040)	(0.040)	(0.040)
GDP	-0.021	-0.045**	-0.027
	(0.020)	(0.021)	(0.022)
Financial crisis	0.436**	-0.065	0.306
	(0.187)	(0.225)	(0.231)
De alio CI firm (dummy)	0.237	0.238	0.249
	(0.186)	(0.187)	(0.187)
No. of categories	0.349***	0.071	0.098**
	(0.040)	(0.056)	(0.049)
Population age at entry	0.813***	0.761***	0.749***
	(0.075)	(0.078)	(0.078)
CI firms density at founding	0.010	0.012*	0.013**
	(0.006)	(0.007)	(0.007)
Population age (T)	-1.376***	-2.160***	-1.520***
	(0.172)	(0.253)	(0.186)
Contrast ($C = N_c / N_w$)		-1.140***	
		(0.396)	
$T \times C$		0.263***	
		(0.040)	
C^2		5.758***	
		(2.031)	
$T \times C^2$		-1.234***	
		(0.207)	
Weighted contrast ($C_w = N_{wc} / N_{ww}$)			-5.04***
			(1.478)
$T \times C_w$			0.878***
			(0.150)
C_w^2			13.178**
			(5.636)
$T \times C_w^2$			-2.456***
			(0.544)
Obs. (No of spells)	5251	5251	5251
Log-likelihood	-762.47	-686.67	-684.65
Haberman's χ^2 (vs. Model)	67.40***$_{(1)}$	151.6***$_{(6)}$	155.64***$_{(6)}$
D.f.	12	16	16

Note: Standard errors in parentheses
* p<0.05; ** p<0.01%; *** p<0.001

I again use surface plot to illustrate the implications of the results, using estimates of weighted contrasts from Model 8[39] (see Figure 5.5). The plotted surface shows how the effect varies over the possible combination of population age and contrast level. When the population is young, there is U-shaped relationship between contrast level and the multiplier of the exit rate (plotted within its observed range), i.e., low-level increases of contrast decrease exit rates of CI firms, while high-level increases of contrast encourage them. As the population matures, the relationship is changed to inversely U-shaped, with contrast effect turning from positive to negative at level of 0.19.

Figure 5.5 Effects of Contrast and Population Age on the Exit Rate of CI Firms



Finally, to check robustness of the results[40], I re-estimate models in Table 5.5 and Table 5.7 by applying the Huber-White sandwich estimator of variance to calculate robust standard errors. Results are shown in Table A6.2 and Table A6.3, respectively (in Appendix 6). The effects for the four main contrast variables (two age-independent and two age-dependent) are significant at the level of 0.001 in both of the entry and exit models, confirming the validity and robustness of my results.

[39] Given the vast number of individual CI firms and the great diversity in the estimated hazard of exit, drawing a scatterplot by using the exact information obtained historically (as in Figure5.4) is not plausible here, since it would lead to an undistinguishable graph.

[40] As explained in Chapter Four, the assumption of independence of observations may not be appropriate for both of the entry and exit models.

5.8 Discussion

The chapter began by asking how and when a new organizational form will emerge. I follow the contrast-dependence framework but with some adaptations. I argue that in general, increasing level of contrast facilitates legitimation of the population, but under certain circumstances, it may undermine the process. I made two major claims in this Chapter. (1) Carrying capacity of environment in which a population presents changes positively with legitimation level of the population. In other words, environment is endogenous, rather than exogenous as assumed in available ecological models. (2) Given different level of carrying capacity in the environment, different level of contrast works differently in shaping population evolution. In a population where carrying capacity is small, a conglomeration of members with high GoM is likely to intensify competition and depress the founding rates of the population. However, if carrying capacity develops and reaches a certain threshold, a further increase of density of members with high GoM will eventually override the initial competition effect and help new forms to cohere.

The findings for the contrast level of CI population offer strong support for the proposed theories. The results show that when the legitimation level of CI population is low (i.e., carrying capacity of the environment is small), a further increase of CI firms (i.e., those with high GoM) could easily exhaust the strained resources and intensify competition. In other words, legitimacy of the form could be temporarily hindered with increasing level of contrast. However, there are exceptions. Small carrying capacity is less likely to stimulate competition if the following conditions are met: (1) CI population is at its early years of life; (2) the contrast level of CI population is low. Since density of CI population in its early years is very small, it is unlikely that low-level growth of CI firms will hit resource constraints. Therefore legitimacy should increase with level of population contrast. When the number of CI firms further increased and reached a certain threshold, the label of CI began to gain a certain sense of recognition and acceptance within audiences, in other words, carrying capacity of the environment is largely expanded. A further increase of CI firms now works positively on legitimation of the population. However, before being legitimated, the population became significantly fragmented at later years of history (thanks to a sharp

increase of firms with low GoM), legitimation process of the population was seriously undermined.

Given its low contrast level at late stage, CI population may never become an organizational form. According to Hannan et al. (2007)'s conceptual framework about form emergence, CI population may stop short of becoming a category or, to elucidate precisely, it is in a spectrum somewhere between *class* and *category* (see Figure 5.1). Given that CI is an exotic concept, there is virtually no contention in the industry over choice of labels. "Corporate image" – an alternative translation of the CI concept, fully dominates the usage of the label. Questions such as "who is it" are unlikely to cause trouble among audience segments. If audiences were asked to list the "CI firms", they might well have largely agreed about the lists. In other words, there is a high level of extensional consensus among audiences about the application of CI label. The concept is therefore (at least) a "*class*", as defined by Hannan et al. (2007). High level of extensional consensus, however, does not necessarily lead to agreement about the meaning of the label. Today ambiguity and vagueness about the CI concept still prevail in the industry. Questions such as "what is it" not only confuse outsiders, in many cases, but also industry insiders. Some of CI firms fuse aesthetic design and strategy consulting together, and believe this is authentic CI consulting, while many more simply treat CI as a synonym of graphic design, A small number of firms go even further and claim that CI consulting is a practice of corporate strategy consulting. Given the increasing level of population fragmentation, the class may never become a category, let alone an organization form.

The problem with the industry is perhaps due to (1) the elusive nature of the terminology "identity". Although practitioners adopt "image" (a notion that is slightly more decisive than "identity") as the label of the industry in China, the two concepts are in fact hard to distinguish among the general public, especially in Chinese translation. The fact that the two concepts are ubiquitous and are used with reckless permissiveness among practitioner circles and scholars makes them unlikely appropriate labels for a category. As suggested by Fine (2004):

"*A label must be simultaneously descriptive, political, and aesthetic… The label should make sense in light of the body of objects that the participants "know" belong*

together. The meaningful character of the word should correspond to the content of the object and the position of the creators… The label should [also] be 'good to think' and 'good to say'."

As is usually the case, the more ubiquitous a concept becomes, the less informative it will be. Therefore the two concepts are probably not a good choice for a category. (2) Another problem with the concept is its close associations with a number of relatively discrete disciplines. The following authors provide an overview of the following associated concepts in the domain of business identity/image: corporate identity (Balmer 1998), corporate image (Grunig 1993), corporate reputation (Fombrun and van Riel 1997), organizational identity (Whetten and Godfrey 1998), corporate personality (Olins 1978), visual identity (Chajet and Schachtman 1998). The muddled use of the terminology has, perhaps, contributed more to the fog surrounding the business identity domain than any other factor, which in turn, might partly explain the increasingly low level of population contrast of the industry in Shenzhen.

My findings contribute to existing literature in two major ways. Firstly, as noted earlier, investigations of form emergence in traditional studies typically follow the model of density dependence. However, the theory is criticized by some neo-institutionalists for not having the details of the legitimation process specified (Zucker 1989; Baum and Powell 1995; also see Bogaert, Boone et al. 2006 for a general discussion). Zucker (1989) claims that this formulation yields "*inadequately specified tests of institutional theory*" because legitimation and competition are not measured directly. The contrast-dependence theory employed in this study seems to rectify the problem. By taking into account the perceptions of social actors with regard to the underlying blueprint of the population, as well as organizational density across historical context, contrast-dependence model are able to combine insights of institutional theory within ecological framework. Furthermore, by quantifying detailed processes described in institutional theory, contrast dependence also has the potential to advance institutional theory.

Secondly, my findings demonstrate that environment is an active component of the research programme on ecology of organizations. Organizations and their environment are usually coevolved. That is, there is a presence of feedback processes and co-

evolutionary mechanisms linking organizational populations and their environments. The findings show that such feedback processes are vital in shaping organizational dynamics. As such, understanding how the co-evolutionary mechanisms operate in the fuzzy-set context would advance our knowledge and facilitate theory developments in the field.

Chapter Six

Conclusions

In this final Chapter, I will first briefly review the specific theoretical developments reported in the foregoing Chapters, as well as the main findings in empirical analysis. I will also discuss generalizability and potential limitations of the findings of this study. The Chapter closes with some possible directions for future research in the field of organizational ecology.

6.1 Summary of Main Findings

The bulk of this thesis, as stated in Chapter 1, seeks to address three main theoretical issues in the framework of organizational ecology: (1) density-dependence theory in a fuzzy construction, (2) competition dynamics of organizations, and (3) emergence of organizational forms. These issues are investigated using data on corporate identity consultancy in Shenzhen China.

First of all, this study seeks to extend our understanding of the well-established density-dependent theory, by testing it in the fuzzy CI population in Shenzhen. However, even the density measure has been reformulated to take into account heterogeneity of organizations in the population, results show that density-dependent theory still does not hold: the first-order effect of fuzzy density on firms' exits is positive (implying a competitive effect), whereas second-order effect of fuzzy density is negative, showing an inversely U-shaped relationship between fuzzy density and organizations' exit rates. Although one can argue that the absence of the legitimation effect could result from the fact that CI industry is not an entirely new market, as it is simply a fusion form of graphic design and strategy/management consultancy. If legitimation spills over from graphic design and management consultancy to CI

consultancy, then one can expect that the competition effect of density dominates. Nevertheless, the historical analyses of the CI industry in Chapter 2 suggest that this is unlikely to be the case. Although the three industries are related, CI industry is far from being legitimated, as indicated in Chapter 2 and Chapter 5. Furthermore, even the positive first-order effect of density can be explained by using theory of legitimation spillover, the negative second-order effect of density is still an occurrence unfathomable. Therefore I suspect that density-dependence theory alone might not be sufficient to explain organizational dynamics in a fuzzy setup.

The problem, as I argued earlier, probably lies in the fact that audiences' consensus level about the underlying blueprint of the population is not properly figured in the model. Audiences' consensus level about a particular concept (i.e., the contrast level of a population), as suggested by Hannan and his colleagues (2007), is vital in shaping organizational legitimation. Moreover, I argue that contrast also plays a significant role in affecting organizational competition, since it directly affects resources availability for organizations. However, such information is missing in the fuzzy density measure. In other words, given a fuzzy density, we don't know whether it is higher-GoM members that dominate the population or lower-GoM members take the lead, and we don't know the relative contrast of members with varying level of GoM. Therefore I suggest that contrast-dependent model might be a better option in examining organizational dynamics in a fuzzy context.

The second effort of this study aims to extend our understanding of patterns of organizational competition. Hannan et al. (2007) suggest that in general cases, organizations with lower GoM experience stronger selection pressure than those with higher GoM. I extended their theory by arguing that the general theory does not apply in a very young population. Following their arguments that organizational populations differ in perceived valence, I tied population valence to its age. In particular, I argued that the valence of a young population is likely to be perceived as neutral, whereas an aged population will usually be assigned either positive or negative valence. Population valence matters for organizations in two ways: (1) a neutral valence means the potency of cultural classification is dormant, and all the members in the category do not subject to classification constraints; (2) a positive or negative valence means the

potency of cultural classification is activated, organizational members are now subject to significant constraints imposed by the classification.

The extension of the theory allows intrinsic appeal of organizations to vary across different stage of population life. In a population with neutral valence, intrinsic appeal of the offer (that associated with the population) is low for all the members. However, organizations that are less focused on the offer often receive certain protection from a variety of established resources, including resources from their original firms and resources from their established businesses in other industry. The protections received are usually sufficient to ensure operation for an extended period. On the other hand, organizations that are more focussed on the offer are typically *de novo* firms. They lack resources and experience, and they cannot receive any protection from other resources. Therefore organizations that are less focused on the offer experience a less degree of selection pressure than those that are more focused do. As the population ages and happened to be assigned a positive valence, however, intrinsic appeal of organizations' offers now has a positive relationship with their grade of membership. Lower-GoM members are poor fits in the category, and they are more likely to be sanctioned by audiences for their low level of intrinsic appeal. In short, the study provides a complete picture of diffuse competition by attending to nature of populations at their initial stage. The efforts can help solve certain inconsistencies found in earlier studies.

The third theoretical issue in this thesis focuses on the possibility that CI industry may become a (cognitive) organizational form. Existing researches typically follow the logic of density-dependence in examining form emergence. In view of the problem (identified earlier) with the application of the theory in a fuzzy framework, I opt for the recently developed theory of contrast dependence (Hannan, Pólos et al. 2007) to investigate the process of form emergence in CI industry. The theory suggests a monotonic relationship between contrast of a population and its level of legitimation. Nevertheless, I find the underlying mechanism of legitimation is more delicate than predicted by the theory. The main argument I made in the study is that carrying capacity of an environment in which a population presents is dynamic, rather than constant, as assumed in most ecological studies. More specifically, it changes positively with legitimation level of the population. The argument is important in the

sense that it allows patterns of organizational legitimation and competition to change dynamically across different levels of population contrast.

My findings provide support for the above arguments. In particular, I find that if carrying capacity of an environment is small, a conglomeration of members with high GoM will (temporarily) intensify competition and hamper legitimation of the population. However, if carrying capacity is sufficiently expanded, population-level legitimation will work hand in hand with the contrast level. Given the (increasingly) low level of population contrast at late stage, I suggest that the CI population may never become an organizational form.

6.2 Generalizability and Limitations

To what extent are the present findings generalizable to other settings? Firstly, as for competition dynamics presented in Chapter 4, I speculate that the findings may extend well beyond the domain of China and apply to other settings as well. The findings are not context specific and are expected to be replicated in other settings if researchers pay specific attention to early stage of a population. For instance, similar results are found in Carroll et al. (1996)'s study in American automobile industry. The parallel finding provides confidence that similar findings can be found in other industries or countries. Secondly, as for form emergence described in Chapter 5, it is likely that the processes mainly apply to fragmented, decentralized industries (DiMaggio 1991; Rao, Morrill et al. 2000). As suggested by Rao et al. (2000), such industries typically lack a centre of power, elites are disorganized and possess little influence to change or define the system. In such a decentralized field, the emergence of organizational form is more likely to be the result of collective action of large number of powerless organizations, which stands in contrast with centralized industries, in which governmental bodies and authorities usually play a more important role in shaping form legitimation.

Of course, this thesis has its limitations. One of them may be the measure of grade of membership. As suggested by its definition, grade of membership of an organization should reflect audiences' perceptions about its fit in the category. Quantifying grades

of membership that audiences assign to organizations would involve approaches such as investigating public perceptions or content analysis of media reports (e.g. Ruef 2000; McKendrick, Jaffee et al. 2003; Perretti, Negro et al. 2008). In this thesis, however, the GoM measure is calculated by attending to specific feature values held by organizations (i.e., lines of services offered). In other words, by focusing only on internal audiences, it seems that the measure does not take into account perceptions held by external agents, which pose significant limitation on its analytical capabilities. Nevertheless, since lines of services reported by organizations are publicly available in registration department of government, in yellow pages, and in other online resources, external audiences typically rely on such information to identify and approach organizations of interest, therefore it is possible that feature values of organizations would in a certain sense reflect audiences' preferences, and the trends of popularity, of a particular concept, thus it is not entirely unrelated to perceptions of (external) audiences.

Another problem of this study is its scope of research. Although Shenzhen is the most concentrated city in terms of CI consulting business in China, it is not the cradle of the industry in China. The business of CI in fact was born in Guangzhou, a metropolis which is close to Shenzhen. It is possible that the legitimation process of CI population in Shenzhen would be significantly influenced by its counterparts in Guangzhou. Ignoring a place which is geographically adjacent and has important implication in terms of potential legitimation spillover might probably lead to an inaccurate or even misleading result.

There is another limitation of this study. As argued in Chapter 4, population density alone might not be able to sufficiently explain dynamics of organizations in a fuzzy framework, Chapter 5 therefore uses only contrast in the investigation of form emergence. However, such an approach has its problems. In Chapter 5 it appears that the contrast measure alone cannot properly explain organizational competition (sometimes it had to resort to density in order to give a proper explanation). Therefore a combination of contrast and density might be more appropriate in studying organizational dynamics in a fuzzy setup.

6.3 Recommendations for Future Research

Given that the fuzzy-set theory is just recently developed, there are a wide variety of possible avenues for future research. One strategy could be to investigate dynamics of inter-population competition and legitimation spillover. As explained earlier, CI population is closely intertwined with three relatively discrete industries, namely, graphic design, advertising, and strategy/management. It would be interesting to examine in depth the ecological interdependence of these populations. Do they have any legitimation effects on CI population? How do they compete with each other? Ecological interdependence is always one of the main focuses in ecological studies (see Barnett and Carroll 1987; Staber 1992; Dobrev, Ozdemir et al. 2006), yet such research has rarely been undertaken in a fuzzy-set framework, therefore such a direction would be of great interest for future research.

A second area could be to examine niche width of firms and their survival chances in the CI population. The data in my CI context covers detailed information about lines of business reported by the company, which makes it possible to measure niche width of a company. Niche studies (such as generalism, specialism, resource partitioning, etc.) are another major line of research in organizational ecology. A large number of empirical research in the field has arisen in the past two decades (see Carroll and Swaminathan 1992; Freeman and Lomi 1994; Hsu, Hannan et al. 2007). Again, only scant empirical researches in this field follow fuzzy-set framework (but see Negro, Hannan et al. 2008). It would be interesting to see how niche width or category straddling in such a context affects categorical contrast, and how it affects audiences' appeal. Moreover, as argued in Chapter four, cultural categories differ in perceived valence. More interesting questions would rise as a result: in a category with neutral valence, do generalists hold an edge over specialists? Or is it the other way around? What are the underlying mechanisms? How about in a category with positive (or negative) valence?[41]

[41] It appears that the questions raised here are similar to what I have argued in Chapter four. However, it is important to note that there are fundamental differences between the concept of grade of membership and the generalism/specialism notion. In fact, organizations with high GoM are not necessarily specialists; likewise, organizations with low GoM are not necessarily generalists.

There is another area worthy of attention, which is derived from a limitation explained in section 6.2. This study focuses only on category contrast in the investigation of form emergence. It would be interesting to incorporate fuzzy density into the picture. Indeed, as suggested by Hannan and his colleagues (Hannan, Pólos et al. 2007), "*both contrast and density might well turn out to matter for the development of legitimation*". Bringing contrast and fuzzy density together would surely produce a more complete and concrete picture for the explanation of organizational legitimation in a fuzzy construction.

Appendix

Appendix 1

Relationships among CI consultancy, graphic design, advertising, and general management consultancy

Compared to CI consultancy, advertising, graphic design and general management consultancy are three distinctively different industries, each has its own audiences and niches. However, certain overlaps in resource space and identity space among these sectors, coupled with the fact that corporate identity consultancy has its roots in design, make them look similar and sometimes even confusing.

Corporate identity consultancy

Corporate identity consultancy generally refers to companies which fuse graphic design and management consulting together, aiming at reinventing the desired identity for relevant clients. In practice, however, the industry can be segmented into three subpopulations. In sequence of emergence, they are: CI design (ID), CI design consulting (IDC), and CI consulting (IC). CI design companies refer to those that focus only on visual identity design (e.g. corporate housestyle, brand, logo design, etc.), and CI consulting agencies refer to those that offers only "intangible" identity consulting (e.g. strategy, brand, or corporate value consulting, etc.). CI design consulting firms incorporates both of the elements offered by the other two subpopulations, and was once argued as the genuine CI companies. Wolff Olins in the UK, PAOS in Japan, and Landor in the US, are all typical examples of IDC companies.

Graphic design firms

Graphic design companies refer to those companies that engage in analyzing and creating visual solutions to communication problems for clients. Their expertise mainly focus on visual identity design, including graphical user interface design, products/business logo design, packaging design, marketing brochure design, etc. Most often, the client informs a design company of the desired image it wants to create, and the design firm creates a series of physical designs or logos for the clients to select from. Recently an increasing number of graphic designers also are developing material for Internet web pages and interactive media as well. Design companies numbered in the thousands in China. They are usually small in size and scale; never did their work extend into the domains of corporate identity construction. Not surprisingly, employees of design firms are artists, architects, and graphic designers.

Advertising agency

An advertising agency is a service business that is dedicated to creating, planning, and handling advertising for its clients. It provides a broader extent of services than graphic design firms, such as advertisings and television commercials. The business sizes of ad agencies vary significantly, ranging from one or two person shops to multinational companies. Most domestic ad agencies tend to be small; they compete with CI companies in the development of visual identity systems. However, their work is generally regarded as being somewhat limited in scope. Furthermore, their projects are usually of shorter duration and have smaller average billings than CI consultancy. Another distinction is that ad agencies normally undertake many projects at the same time, which in inconceivable in CI consultancy – they usually handle one client each time. Recently, however, targeting on the similar niches of CI consultancy, some big ad agencies have started providing new services such as overall marketing and branding solutions for their clients. Personnel employed in ad agencies are more diversified than in graphic design firms, including copywriters, graphic designers, artists, salesman, etc. As there is no indication of how their billings break down by business segment - all we have is their revenue in aggregate terms, it is hard to uncover information about their competition with CI companies.

General management/strategy consultancy

General management/strategy consultancy (sometimes also called strategy consultancy) refers to firms that specialize in helping companies improve performance through analysis of existing business problems and development of future plans. They provide highly sophisticated services such as technology implementations, strategy development, supply chain management, product development, manufacturing management and sometimes, corporate identity solution, etc. CI solution here, however, has never been their core business. Furthermore, management consulting companies generally employ more diversified and better educated personnel than in CI firms; strong skills in organization and quantitative analysis, rather than a background in graphic design, are critical for the job. Another distinction is that they are usually much bigger in business scale than CI consultancies. Obtaining information about their competition with CI companies, however, has again proved to be problematic, since their revenue does not break down by business segment – be it general strategy, CI, supply chain, or otherwise. Prototypes of general management consultancy can be found in Boston Consulting Group, Bain & Co., or McKinsey & Co., etc.

Appendix 2

The International Corporate Identity Group's (ICIG) statement on corporate identity

The Strathclyde Statement

Every organization has an identity. It articulates the corporate ethos, aims and values and presents a sense of individuality that can help to differentiate the organization within its competitive environment.

When well managed, corporate identity can be a powerful means of integrating the many disciplines and activities essential to an organization's success. It can also provide the visual cohesion necessary to ensure that all corporate communications are coherent with each other and result in an image consistent with the organization's defining ethos and character.

By effectively managing its corporate identity an organization can build understanding and commitment among its diverse stakeholders. This can be manifested in an ability to attract and retain customers and employees, achieve strategic alliances, gain the support of financial markets and generate a sense of direction and purpose. Corporate identity is a strategic issue.

Corporate identity differs from traditional brand marketing since it is concerned with all of an organization's stakeholders and the multi-faceted way in which an organization communicates.

(This is a revised version of the original statement which was drafted at Strachur, Argyll, Scotland, on 17 and 18 February 1995.)

Appendix 3

Table A3 List of 59 Categories in the Whole Population

Category Code	Category
1	**Corporate Image Consultancy**
2	Image Consultancy
3	Graphic Design Agency
4	Advertising Agency
5	Management Consultancy
6	Corporate Consultancy
7	Marketing Consultancy
8	Etiquette Consultancy
9	Exhibition Consultancy
10	Economic Information Consultancy
11	Investment Consultancy
12	Construction Material Supply
13	Business Planning Agency
14	Culture Communication
15	Industrial Corporation
16	Import and Export Corporation
17	Catering Management
18	Real Estate Consultancy
19	Technology Development
20	Printing Corporation
21	Credit Guarantee Corporation
22	Electronic Technology Corporation
23	Computer Corporation
24	Trademark Agency
25	Housekeeping Company
26	Environment Art Design Company
27	Freight Forwarder
28	Cleaning Agency
29	Financial Company
30	Interior Design Company
31	Assets Management Company
32	Education Agency
33	Information Technology Company
34	Hotel Management
35	Apparel Company
36	Logistics Company
37	Gift Company
38	Information Service Company

Table A3 continued

Category Code	Category
39	Network Technology Company
40	Communication Company
41	Public Relations Agency
42	Photo Studios
43	Cosmetics Company
44	Sports Company
45	Talents Hunting Agency
46	Travel Company
47	Business Development Company
48	Motor Corporation
49	Furniture Company
50	Jewellery Company
51	Media Company
52	News Agency
53	Express Delivery Agency
54	Pharmaceuticals Company
55	Brand Consulting Agency
56	Translation Agency
57	Airlines Company
58	Electromechanics Company
59	Others[†]

[†]Note: the "Others" category consists of small number firms that doesn't make sense to be categorized. Firms are classified under such a category when following two conditions are met: 1. the key label (that may denote a potential category) carried in company names are not very informative; and 2. the key label are used by very small number of firms (less than 10 firms).

Appendix 4

A4 List of Lines of Services Offered by Firms in the CI Category

Service Code	Lines of Services
A1	Corporate Image Consulting / Design
A2	Personal Image Consulting / Design
B1	Strategic Management Consulting
B4	Corporate Culture Consulting
C1	Brand Consulting
D1	Marketing Consulting
E1	Graphic Design
F1	Photography Design
F2	Landscape Design
F3	Interior Design
F4	Furniture Design
F6	Fashion Design
F70	Website Construction
F71	Boutique / Shop Design
F82	Architectural Model Design
G6	Financial Counselling
H2	Cultural Information Consulting
I1	Investment Consulting
J3	Real Estate Consulting
K1	Exhibition Consulting
L1	Advertising
M3	Etiquette Consulting
M6	Movie & TV Consulting
Q1	Computer Software / Network Design
R1	Housekeeping Service
R6	Translation Service

Appendix 5 Correlations of Variables

A5.1 Correlations of Variables of Chapter 4

Table A5.1 Correlations of Variables Used in Exit Analyses in Chapter 4

	Variable	1	2	3	4	5	6	7
1.	Firm Size							
2.	GDP	-0.16						
3.	Density at founding (N_0) $\times 10^{-2}$	-0.24	0.64					
4.	Financial Crisis	0.08	-0.40	-0.31				
5.	Category density	0.13	0.01	0.03	-0.02			
6.	Population age (T)	-0.18	0.96	0.66	-0.40	0.01		
7.	Whole density (N_t) $\times 10^{-2}$	-0.16	0.99	0.67	-0.40	0.02	0.97	
8.	$N_t^2 \times 10^{-5}$	-0.13	0.98	0.63	-0.35	0.02	0.90	0.98
9.	GoM_t	-0.21	-0.12	-0.16	0.07	-0.36	-0.12	-0.13
10.	$GoM_t \times T$	-0.25	0.10	-0.01	-0.03	-0.35	0.11	0.09
11.	CI firm	-0.14	-0.06	-0.13	0.05	-0.20	-0.05	-0.07
12.	CI firm $\times T$	-0.15	0.02	-0.09	0.00	-0.20	0.03	0.01
13.	Fuzzy density (N_{ft})	-0.17	0.95	0.67	-0.42	0.01	0.98	0.97
14.	N_{ft}^2	-0.16	0.97	0.67	-0.43	0.02	0.96	0.99

	Variable	8	9	10	11	12	13	
9.	GoM_t	-0.12						
10.	$GoM_t \times T$	0.08	0.94					
11.	CI firm	-0.07	0.78	0.75				
12.	CI firm $\times T$	0.00	0.73	0.77	0.97			
13.	Fuzzy density (N_{ft})	0.89	-0.13	0.10	-0.06	0.02		
14.	$N_{ft}^2 \times 10^{-3}$	0.95	-0.13	0.09	-0.07	0.01	0.98	

A5.2 Correlations of Variables of Chapter 5

Table A5.2.1 Correlations of Variables Used in Founding Analyses in Chapter 5

Variable	1	2	3	4	5	6	7	8
1. Lagged entries								
2. (Lagged entries)^2 ×10^{-2}	0.92							
3. GDP (ten billions)	0.34	0.21						
4. Density of all firms (N_a) ×10^{-2}	0.32	0.19	0.99					
5. CI density (N_c) ×10^{-1}	0.55	0.40	0.91	0.92				
6. Weighted density of all firms (N_{wa}) ×10^{-1}	0.50	0.32	0.96	0.96	0.97			
7. Weighted density of CI firms (N_{wc})	0.69	0.54	0.72	0.72	0.94	0.86		
8. Population age (T)	0.50	0.33	0.96	0.95	0.96	0.99	0.84	
9. Contrast (N_c / N_a)	0.68	0.50	0.31	0.29	0.57	0.52	0.74	0.49
10. T × Contrast	0.71	0.52	0.73	0.71	0.91	0.87	0.97	0.87
11. Contrast squared	0.65	0.49	0.21	0.18	0.49	0.42	0.70	0.41
12. T × Contrast squared	0.74	0.57	0.50	0.48	0.76	0.69	0.92	0.69
13. Weighted contrast (N_{wc} / N_{wa})	0.75	0.58	0.51	0.49	0.77	0.70	0.93	0.69
14. T × weighted contrast	0.71	0.56	0.71	0.70	0.92	0.84	0.99	0.84
15. Weighted contrast squared	0.75	0.62	0.40	0.37	0.69	0.58	0.90	0.58
16. T × weighted contrast squared	0.73	0.62	0.51	0.50	0.79	0.66	0.95	0.66

Variable	9	10	11	12	13	14	15
10. T × Contrast	0.81						
11. Contrast squared	0.98	0.77					
12. T × Contrast squared	0.90	0.95	0.89				
13. Weighted contrast (N_{wc} / N_{wa})	0.92	0.96	0.91	1.00			
14. T × weighted contrast	0.76	0.98	0.73	0.94	0.94		
15. Weighted contrast squared	0.85	0.89	0.87	0.97	0.97	0.92	
16. T × weighted contrast squared	0.76	0.90	0.75	0.94	0.94	0.96	0.97

Table A5.2.2 Correlations of Variables Used in Exit Analyses in Chapter 5

Variable	1	2	3	4	5	6	7	8
1. Firm size								
2. GDP	-0.21							
3. Financial crisis	0.15	-0.45						
4. De alio CI firm (dummy)	0.20	-0.11	0.03					
5. No. of categories	-0.26	0.81	-0.46	-0.15				
6. Population age at entry	-0.45	0.55	-0.35	0.02	0.63			
7. CI firms density at founding	-0.45	0.51	-0.35	0.02	0.60	0.95		
8. Density of all firms (N_a) $\times 10^{-2}$	-0.21	0.99	-0.45	-0.11	0.81	0.57	0.54	
9. Density of CI firms (N_c) $\times 10^{-1}$	-0.27	0.76	-0.52	-0.12	0.93	0.62	0.64	0.79
10. $N_c^2 \times 10^{-4}$	-0.25	0.74	-0.53	-0.11	0.86	0.60	0.63	0.78
11. Weighted density of all firms (N_{wa})	-0.24	0.97	-0.43	-0.12	0.89	0.61	0.58	0.98
12. Weighted density of CI firms (N_{wc})	-0.19	0.06	-0.32	-0.06	0.54	0.33	0.40	0.08
13. $N_{wc}^2 \times 10^{-3}$	-0.15	-0.06	-0.31	-0.04	0.38	0.25	0.33	-0.03
14. Population age (T)	-0.24	0.97	-0.50	-0.13	0.92	0.61	0.58	0.97
15. Contrast (N_c / N_a)	0.02	-0.66	0.30	0.02	-0.16	-0.19	-0.16	-0.66
16. $T \times$ Contrast	-0.20	0.09	-0.27	-0.08	0.61	0.34	0.37	0.10
17. Contrast squared	0.03	-0.69	0.31	0.03	-0.23	-0.23	-0.19	-0.70
18. $T \times$ Contrast squared	-0.07	-0.43	-0.01	-0.01	0.12	0.01	0.06	-0.43
19. Weighted contrast (N_{wc} / N_{wa})	-0.07	-0.44	0.00	-0.01	0.11	0.00	0.05	-0.44
20. $T \times$ Weighted contrast	-0.17	-0.02	-0.32	-0.06	0.50	0.28	0.34	-0.01
21. Weighted contrast squared	-0.06	-0.48	-0.05	0.01	0.04	-0.03	0.03	-0.48
22. $T \times$ Weighted contrast squared	-0.10	-0.31	-0.21	-0.02	0.21	0.09	0.16	-0.30

Variable	9	10	11	12	13	14	15	16
10. $N_c^2 \times 10^{-4}$	0.98							
11. Weighted density of all firms (N_{wa})	0.87	0.84						
12. Weighted density of CI firms (N_{wc})	0.68	0.64	0.25					
13. $N_{wc}^2 \times 10^{-3}$	0.57	0.59	0.12	0.96				
14. Population age (T)	0.87	0.83	0.99	0.26	0.11			
15. Contrast (N_c / N_a)	-0.16	-0.25	-0.51	0.56	0.52	-0.50		
16. $T \times$ Contrast	0.65	0.55	0.27	0.95	0.84	0.31	0.63	
17. Contrast squared	-0.22	-0.31	-0.55	0.51	0.48	-0.54	0.99	0.58
18. $T \times$ Contrast squared	0.17	0.09	-0.26	0.81	0.77	-0.23	0.92	0.85
19. Weighted contrast (N_{wc} / N_{wa})	0.17	0.09	-0.27	0.82	0.78	-0.24	0.92	0.85
20. $T \times$ Weighted contrast	0.60	0.54	0.15	0.98	0.93	0.19	0.63	0.97
21. Weighted contrast squared	0.13	0.07	-0.32	0.80	0.80	-0.29	0.89	0.80
22. $T \times$ Weighted contrast squared	0.33	0.29	-0.15	0.91	0.91	-0.12	0.76	0.86

Variable	17	18	19	20	21
18. $T \times$ Contrast squared	0.90				
19. Weighted contrast (N_{wc} / N_{wa})	0.90	1.00			
20. $T \times$ Weighted contrast	0.58	0.87	0.88		
21. Weighted contrast squared	0.88	0.98	0.98	0.86	
22. $T \times$ Weighted contrast squared	0.74	0.94	0.95	0.94	0.97

Appendix 6 Models Re-estimated with Robust Variance Estimators

Table A6.1 ML Estimates of Piecewise Constant Rate Models of Disbanding/Exit for the Whole Population, 1991-2007 (with Robust Variance Estimators)

Variable	Model 7	Model 8	Model 9	Model 10
Tenure: 0<u<=1	-9.285***	-9.617***	-9.446***	-9.503***
	(0.877)	(0.875)	(0.872)	(0.873)
Tenure: 1<u<=2	-7.852***	-8.182***	-8.016***	-8.069***
	(0.868)	(0.866)	(0.863)	(0.864)
Tenure: 2<u<=3	-7.140***	-7.467***	-7.309***	-7.358***
	(0.865)	(0.864)	(0.861)	(0.862)
Tenure: 3<u<=4	-7.015***	-7.335***	-7.187***	-7.231***
	(0.867)	(0.865)	(0.862)	(0.863)
Tenure: 4<u<=7	-6.960***	-7.276***	-7.139***	-7.178***
	(0.868)	(0.867)	(0.863)	(0.864)
Tenure: 7<u<=12	-6.780***	-7.099***	-6.965***	-7.010***
	(0.874)	(0.872)	(0.869)	(0.870)
Tenure: u>12	-6.884***	-7.215***	-7.069***	-7.139***
	(0.931)	(0.930)	(0.928)	(0.929)
Firm Size	-0.282***	-0.283***	-0.269***	-0.271***
	(0.012)	(0.012)	(0.012)	(0.012)
GDP	0.047***	0.049***	0.045***	0.047***
	(0.012)	(0.012)	(0.012)	(0.012)
Financial Crisis	1.739***	1.730***	1.728***	1.740***
	(0.165)	(0.163)	(0.164)	(0.164)
Category density	0.001	0.001	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Population age (T)	-0.043	-0.034	-0.036	-0.039
	(0.112)	(0.111)	(0.112)	(0.112)
Fuzzy density (N_{ft})	0.036***	0.036***	0.036***	0.036***
	(0.001)	(0.001)	(0.001)	(0.001)
$N_{ft}^2 \times 10^{-3}$	-0.049***	-0.050***	-0.049***	-0.049***
	(0.002)	(0.002)	(0.002)	(0.002)
GoM_t	1.254***	4.314***		
	(0.155)	(0.725)		
$GoM_t \times T$		-0.432***		
		(0.055)		
CI firm			0.062*	0.943***
			(0.036)	(0.193)
CI firm $\times$ T				-0.076***
				(0.014)
Observations	66598	66598	66598	66598
Log pseudo-likelihood	-8471.03	-8450.87	-8495.39	-8486.18
Wald Chi2	25767.29***	25534.47***	25403.65***	25247.81***

Note: Robust standard errors in parentheses

* p<0.05; ** p<0.01%; *** p<0.001

Table A6.2 ML Estimates of Negative Binomial Models of Founding/Entry Rates of CI firms, 1992-2007 (with Robust Variance Estimators)

Variable	Model 6	Model 7	Model 8
Lagged entries	0.099***	0.068***	0.040*
	(0.021)	(0.023)	(0.023)
(Lagged entries)^2 $\times 10^{-2}$	-0.192***	-0.118**	-0.061
	(0.055)	(0.057)	(0.057)
GDP	-0.083***	-0.084***	-0.071***
	(0.012)	(0.019)	(0.017)
Population age (T)	0.448***	0.789***	0.738***
	(0.061)	(0.157)	(0.104)
Contrast ($C = N_c / N_w$) $\times 10^2$		0.663***	
		(0.184)	
$T \times C \times 10^2$		-0.076**	
		(0.030)	
$C^2 \times 10^2$		-3.312***	
		(0.994)	
$T \times C^2 \times 10^2$		0.368**	
		(0.150)	
Weighted contrast ($C_w = N_{wc} / N_{ww}$) $\times 10^2$			0.464***
			(0.087)
$T \times C_w \times 10^2$			-0.062***
			(0.010)
$C_w^2 \times 10^2$			-1.735***
			(0.351)
$T \times C_w^2 \times 10^2$			0.215***
			(0.038)
Constant	-0.098	-2.528***	-1.528***
	(0.155)	(0.679)	(0.297)
Observations	179	179	179
Log pseudo-likelihood	-479.77	-469.41	-458.37
Wald Chi2	329.81***	313.61***	337.71***

Note: Robust standard errors in parentheses

* p<0.05; ** p<0.01%; *** p<0.001

Table A6.3 ML Estimates of Piecewise Constant Rate Models of Disbanding/Exit of CI firms, 1992-2007 (with Robust Variance Estimators)

Variable	Model 6	Model 7	Model 8
Tenure: 0<u<=1	-14.702***	1.380	-2.309**
	(1.468)	(1.368)	(1.177)
Tenure: 1<u<=2	-13.170***	2.896**	-0.809
	(1.449)	(1.390)	(1.194)
Tenure: 2<u<=7	-10.857***	5.231***	1.528
	(1.451)	(1.389)	(1.194)
Tenure: u>7	-6.685***	9.343***	5.635***
	(1.508)	(1.417)	(1.232)
Firm size	0.099***	0.097***	0.093***
	(0.034)	(0.034)	(0.034)
GDP	-0.021	-0.045**	-0.027
	(0.017)	(0.019)	(0.019)
Financial crisis	0.436**	-0.065	0.306*
	(0.188)	(0.173)	(0.176)
De alio CI firm (dummy)	0.237	0.238	0.249*
	(0.152)	(0.147)	(0.144)
No. of categories	0.349***	0.071*	0.098***
	(0.035)	(0.037)	(0.033)
Population age at entry	0.813***	0.761***	0.749***
	(0.073)	(0.085)	(0.085)
CI firms density at founding	0.010	0.012*	0.013*
	(0.006)	(0.007)	(0.007)
Population age (T)	-1.376***	-2.160***	-1.520***
	(0.146)	(0.206)	(0.146)
Contrast ($C = N_c / N_w$)		-1.140***	
		(0.318)	
$T \times C$		0.263***	
		(0.033)	
C^2		5.758***	
		(1.658)	
$T \times C^2$		-1.234***	
		(0.172)	
Weighted contrast ($C_w = N_{wc} / N_{ww}$)			-5.04***
			(1.158)
$T \times C_w$			0.878***
			(0.114)
C_w^2			13.178**
			(4.306)
$T \times C_w^2$			-2.456***
			(0.412)
Observations	5251	5251	5251
Log pseudo-likelihood	-762.47	-686.67	-684.65
Wald Chi2	3280.84***	3653.00***	3660.25***

Note: Robust standard errors in parentheses
* p<0.05; ** p<0.01%; *** p<0.001

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